A CASE STUDY OF THE MANIFESTATIONS AND SIGNIFICANCE OF SOCIAL PRESENCE IN A MULTI-USER VIRTUAL ENVIRONMENT

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Abstract

As a type of virtual learning community, multi-user virtual environments (MUVEs) are not only sources of entertainment but are also places where learning opportunities and community development can be created and fostered. Some multi-user virtual environments that have emerged have been designed to serve students and teachers in the K-12 sector. Although learning is a goal in these contexts, this study focused on some of the community building and social networking components. The purpose of this study was to examine whether, to what degree and how nine elementary aged students projected themselves socially through this medium. The results could provide insight into the integration of such environments into K-12 educational contexts and could serve as a launching point for further research into the learning and community aspects of MUVEs. A case study approach was used in this research study. The researcher chose a class of nine students who were enrolled in an educational MUVE as part of their regular studies. Although these students completed assignments in the MUVE, only their social interactions were analyzed. The data was collected from student communication logs in the educational MUVE *Quest Atlantis*™ and from interviews with participants. Document analysis was used to analyze transcripts of student communications in *Quest Atlantis*™ as well as transcripts from text-based interviews. The results obtained demonstrate the types of communication and tool selection patterns of elementary aged students when using text to communicate in a MUVE and provide insight that can be used by teachers to inform the integration of MUVEs in their unique learning contexts.

Findings indicated that frequency of communication varied substantially between participants but message content was similar and content volume varied depending on the communication tool. Gender differences were pronounced. Results also revealed that all participants were comfortable and enjoyed their involvement in the MUVE.

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Chapter One: Introduction

Our time is a time for crossing barriers, for erasing old categories - for probing around.
~Marshall McLuhan

As new information and communication technologies emerge, those responsible for K-12 education should be critical consumers of these technologies, discerning what is valuable to use in educational contexts and implementing them on behalf of and for the benefit of their students.

What are the emerging technologies beginning to influence K-12 students? How can we discern whether and how to incorporate them into the learning process? Are there technologies that could be used to engage students that have not previously been available? Internet based communication and management applications such as *Wikis*™, *Jing*™, *Animoto*™, *Skype*™, *Ning*™ and three-dimensional (3-D) virtual worlds that use video, audio and text-based conferencing can be combined in a variety of ways to provide opportunities for virtual community building and collaboration. Virtual worlds or multi-user virtual environments (MUVEs) are characterized by 3-D virtual environments that simulate real world objects and interactions and are available to multiple users simultaneously, on a global basis (Dede, Dieterle & Clarke, et al. 2007; Nelson, Ketelhut & Clarke, 2005). For example, 3-D virtual worlds such as *Second Life*™ are relatively recent phenomena and their use seems to be gaining in popularity. *Second Life*™ was launched on June 23, 2003 (*Second Life*™ Wikia, 2004), and the number of *Second Life*™ users grew from 5,000 at the beginning of 2005 (Linden, 2006) to more than 1,000,000 by July of 2009 (*Second Life*™ Website, 2009)**.** Do such environments have any relevance to today's K-12 students? That is, do they have a place in the process of learning curricular topics within the traditional K-12 educational system? Could

educational MUVEs redefine what learning looks like for K-12 students or even revolutionize K-12 education by allowing real time, visual student communication and collaboration across geographical and time zone boundaries in a simulated real world context?

In this study the interactions and contributions of nine students between the ages of eight and 13 in the educational virtual world of *Quest Atlantis*™ (QA) were examined to look at how these students projected themselves socially through this medium. Document analysis of transcripts collected from QA and transcripts from standardized open-ended interviews was conducted.

Background

For the purpose of this study, the term virtual learning community (VLC) is used to describe any group of individuals who have come together in cyber space in a context that has learning as a primary goal. The literature associated with virtual learning communities are expanded upon in Chapter Two. Although many examples of VLCs exist, the most relevant type for this study is multi-user virtual environments (MUVEs). For the purposes of this study the terms “MUVE” and “virtual world” are synonymous and will be used interchangeably.

While virtual worlds such as *Second Life*™ are making their way into the digital mainstream, educational virtual worlds are not far behind. *Quest Atlantis*™ (QA) is an exclusive multi-user virtual environment that exists to serve teachers and elementary aged students. In these contexts QA has captured interest from teachers and students around the world and engendered their participation. For example, Barab (2009) reports that, since its launch in 2002, *Quest Atlantis*™ has seen in excess of 20,000 children from

four continents participate in this virtual world**.**

Capitalizing on the popularity of computer gaming and participation in MUVEs among the K-12 population, *Quest Atlantis*™ is an international research initiative that combines education, entertainment and social commitment. Developers used gaming principles and instructional design techniques to provide social learning and networking opportunities for students, allowing them to collaborate with others in real time both in their face-to-face classroom environments and in their interactions with students from around the world. Although virtual worlds like *Second Life*™ are designed for an adult population, QA has been developed specifically for students aged nine to12. A fictional story called the "back story" is provided to orient users to the environment early in their experience, giving them a context and purpose for learning. Educational activities called "quests" are woven into the experience and communication is enhanced through the provision of visual representations of each student called "avatars." Students communicate with each other and with teachers using electronic communication tools such as chat, telegrams and email that are integrated into the QA interface and used in the context of the back story, associated missions and quests.

The developers of *Quest Atlantis*™ promote a holistic approach in advocating and designing a comprehensive system that can be integrated into existing classroom communities. It is implemented primarily in traditional classroom environments so technology in this case supports a larger vision for K-12 e-learning that includes traditional classroom communities (Stuckey & Barab, 2007).

Initially implemented in 2002, *Quest Atlantis*™ is currently being utilized by teachers in several countries around the world, is free for classroom use, has built in

training and professional development opportunities and can be customized by teachers. As it is relatively new to K-12 education, it is just beginning to catch the interest of educators and researchers.

Purpose of the Study

The intent of this study was to analyze the experiences of nine students as they participated in an educational virtual world. Specifically, I wanted to examine manifestations, or lack thereof, of "social presence" (Garrison, Anderson & Archer, 2000, p.3) and contemplate possible significance for elementary education. Social presence is one of three core elements in a theoretical framework called the "Community of Inquiry Model" (Rourke, Anderson, Garrison & Archer, 2001) that views interactions among teachers and students as essential in the development of effective learning communities. It has been defined as "the ability to project one's self and establish personal and purposeful relationships" (Garrison, 2007). Given the young age of my participants and the unique study context, I was interested in how and to what degree they would be able to project themselves socially into this environment and how this in turn might impact teaching and learning.

Research Questions

All students who participate in *Quest Atlantis*™ (QA) have equal access to the communication tools in the environment. I used these tools to examine their communication with each other and with non-class members. I focused my attention on the following questions:

I. How and to what extent do students manifest social presence in QA?

1. Do students express themselves emotionally and if so how?

2. Do students openly communicate with others in the environment and if so how?

3. Do students initiate group cohesiveness and if so how?

II. What characteristics in QA contribute to manifestations of social presence?

1. Does the narrative context of QA promote and support manifestations of social presence and if so how?
2. Do the relational tools in QA promote and support manifestations of social presence and if so how?

Significance of the Study

Although "social presence" has been examined in online secondary and post-secondary contexts (Nippard & Murphy, 2007; Rourke, et al., 2001), there is a paucity of such research in elementary education contexts. Sadik (2003) and Downs and Moller (1999) noted the need for research on the topic of socialization as it pertains to young online learners. Prensky (2001a) and Squire (2002) commented on the need to investigate the educational potential of computer games given the apparent enthusiasm and motivation on the part of children to participate in these games. Barab et al. (2007) affirm this view: "Digital video games provide an important experiential space for supporting meaningful learning, and….it might behove educators to understand and leverage this powerful medium" (p. 26). *Quest Atlantis*™ (QA), as a unique, relevant and innovative MUVE, provides an appropriate research context for investigation in this area. This study was conducted as an attempt to answer the above research challenges by providing an in-depth look at how some elementary age students express themselves socially in an educational MUVE.

Definitions

The following definitions will be helpful when reading this study:

Asynchronous: Communication that is not in real time.

Avatar: A computer simulated graphic character that is often customizable and serves as a visual representation of a person interacting in a MUVE.

Back story/Narrative: The story that provides a context for interaction in a MUVE

Community of Inquiry (COI) Model: A model for designing instruction comprised of three central elements: cognitive presence, social presence and teaching presence. The instrument developed by Rourke et al. (2001) to analyze data on social presence is divided into three categories: *affective*, *cohesive* and *interactive.*

> *Affective Category**:*** A category within the COI model in which "social presence" is indicated by expressions of "emotion, feelings and mood" (Rourke, et al. 2001, p.7*).*

> *Cohesive Category*: A category within the COI model in which "social presence" is indicated by "activities that build and sustain a sense of group commitment" (Rourke, et al. 2001, p.9*).*

> *Interactive Category**:*** A category within the COI model in which "social presence" is indicated by expressions of **"**willingness to maintain and prolong contact, and tacitly indicate interpersonal support, encouragement, and acceptance of the initiator" (Rourke et al. 2001, p.9)

Bulletin board: a *Quest Atlantis*™ electronic, asynchronous communication tool where users leave messages for others to read and possibly reply.

Chat: a Quest Atlantis™ electronic, synchronous, instant messaging tool used primarily for informal communication.

MUVE: Multi-user virtual environment that is 3-D and able to engage learners from around the globe in real time and asynchronously and simulate real world objects and interactions.

Social Presence: One of the core elements of the COI Model. Garrison (2000) defined social presence as "the ability of participants in the Community of Inquiry to project their personal characteristics into the community, thereby presenting themselves to the other participants as 'real people'" (p.3).

Synchronous: Real time communication.

Telegram: a Quest Atlantis™ electronic communication tool that can be used synchronously or asynchronously to transmit messages.
Weblog: a Quest Atlantis electronic, asynchronous communication tool where users post their thoughts and ideas about chosen subjects.
Virtual Learning Community: Any group of individuals who have come together in cyber space in a context that has learning as a primary goal.

Delimitations

My decision to use the Community of Inquiry (COI) model as a theoretical base meant that my interpretations were not completely emergent. However, this also meant that my study was built on previous work, lending strength to my findings. I chose research questions that related to social presence and not cognitive or teaching presence in order to make my study more focused and specific.

I decided to include all nine students in my class who were enrolled in *Quest Atlantis*™ (QA). Since a study on gender was not my focus, I did not attempt to include equal numbers of male and female students. As both teacher and researcher, I had an insider's perspective and biases that are both known and unknown to me. It is my intent to be transparent and identify instances where my dual role may have influenced my findings.

Limitations

This study had a small number of participants thereby restricting generalization of results. Therefore, the results of my study are restricted to virtual world contexts as well as to the age range of my participants. I will not be reporting inter-coder reliability statistics as I did not have another coder to verify my findings. In Chapter Three I provide a description of other methods used to ensure reliability, quality and rigor of my study.

Chapter Two: Literature Review

Unbeknown to many…a quiet revolution was amassing over the last two decades. And, slowly but surely, the whispers eventually intensified into roars. The socialization of the Web and content publishing…is now forcing a media renaissance that is transforming information distribution, human interaction and everything that orbits this nascent ecosystem. ~Brian Solis

Background

This literature review provides an examination of the literature pertaining to the larger context of formal virtual learning communities (VLCs) in which multi-user virtual environments (MUVEs) at the K-12 level are situated. A broad discussion of VLCs and a more specified discussion of MUVEs as examples of VLCs are included. This review was limited by the availability of formal relevant literature and so informal and unpublished literature was used to paint a comprehensive picture.

Virtual learning communities (VLCs) often referred to as online learning have proliferated both at the K-12 and the adult levels. Multi-user virtual environments as types of VLCs at the K-12 level, however, are relatively new phenomena. Traditionally, literature regarding online learning has focused largely on the educational applications of information and communication technology (ICT) and learner-computer interaction. These isolated computer-mediated environments, where the need for community and human interaction remains unchanged and unchallenged, stand in contrast with face-to-face environments where community has often been created and fostered. However, new technologies such as virtual worlds that provide opportunities for learner-learner interaction have the potential to facilitate interactive, collaborative communities. Potential applications for VLCs are growing, inviting the enthusiasm, innovation and attention of researchers and practitioners. Associated literature is expanding and the need

for further research has been noted (Nippard & Murphy, 2007). Although there is a growing body of literature in the arena of higher education the sparseness of literature pertaining to K-12 contexts reveals a need for further investigation. For this review, a search of the literature associated with K-12 virtual learning communities was conducted.

Research on virtual learning communities as it pertains to the K-12 population is scarce. Sadik (2003) and Downs and Moller (1999) noted the need for research to address the younger generation of online learners. The paucity of literature at the K-12 level is largely attributable to the fact that the field is in the early stages of development and as such, concepts are not clearly defined. Research has suggested that educational and online communities in the K-12 sector are underdeveloped (Coffman, 2004; Downes, 1998; Gordin, Gomez, Pea, & Fishman, 1996). Of significant interest for this review are contextual background, theoretical underpinnings, instructional design considerations and communication tools, as well as changing roles for teachers and students.

Context

Creation of learning communities and appropriate use of new technologies are seen as key in the success of distance education (Beldarrain, 2006; Palloff and Pratt (1999). Descriptions and parameters of virtual learning communities are as varied as those of traditional face-to-face learning communities. Also, definitions for terms associated with VLCs such as e-learning, are numerous and not necessarily consistent. Even the term virtual schooling can have different meanings for different people (Barbour, 2008). Unstable terminology leads to confusion and a lack of clarity, but can be expected in an emergent and formative area of practice (Pea, 2002; Barbour; 2008**).** According to Pea (2002), definitions for the term “virtual learning community” can be

derived from examining the three component parts: virtual, learning and community. The term “virtual” indicates that the medium for communication and community formation are computer and related web-based technologies. “Learning” can occur in many ways from deliberate to fortuitous and is context dependent; based on the goals of the particular community (Schwier, 2007). “Community” refers to a group of participants who have something in common; at the heart of any community is a shared sense of purpose for being together, which sets the tone for, and delineates parameters of the community (Schwier, 2007). Stuckey and Barab (2007) noted that community can be different to different people and that, as a concept, it is gaining in popularity. Taken together, the three concepts are associated with collaboration, interaction, exploration, reflection, knowledge creation, knowledge sharing, shared goals and common interests (Coffman, 2004).

Virtual learning communities, as an emerging trend in education take many shapes and forms. They differ in purpose and scope using both asynchronous and synchronous communication methods. They can be found in various contexts including traditional classrooms, online courses and distance education programs. Perspectives on K-12 virtual learning communities vary. While Stuckey and Barab (2007) emphasized the importance of integrating virtual communities into existing classroom settings, Murphy (2005) noted cultural and practical advantages of broadband enabled virtual learning, in distance education contexts including the ability to communicate and collaborate across cultures, languages and geographical separation, access to experts and exposure to new experiences that might be otherwise unavailable.

Broadband tools include video and audio conferencing as well as computer

mediated communication. Murphy (2005) also noted that in distance education contexts, new technologies enable students in remote geographical communities to access high quality learning environments and experiences (Murphy, 2005; Murphy & Coffin, 2003). Stuckey and Barab (2007) and Murphy (2005) agree that VLCs can provide access to mentors and content area specialists.

Multi-user virtual environments (MUVEs), as unique virtual learning contexts, are characterized by 3-D virtual environments that have the potential to engage learners from a local context or around the globe. They simulate real world environments with objects, landscapes and people and allow users to interact, communicate and collaborate both synchronously and asynchronously. Multi-user virtual environments promote engagement through student autonomy and interactivity by allowing the students to participate actively by interacting with the objects and people in the virtual world**.** Potential benefits listed by Blaisdell (2006) include better attendance at school, increased ability to concentrate, and the development of relevant skills. He also speculated that while the primary objective for video games is entertainment, the primary goal for MUVEs is learning. The *Quest Atlantis*™ MUVE targets students in traditional classrooms and views the teacher as essential for integrating the associated quests and missions to achieve curricular objectives and maximizing learning (Stuckey & Barab, 2007.

Theoretical Foundations

Although virtual learning community technology itself is relatively new, some of the distinct features of virtual learning communities have their roots in learning theory. The work of Dewey (1933), Piaget (1970), Vygotsky (1962), and Bruner (1986) has

influenced current theoretical approaches to technology-mediated learning within virtual community contexts. These approaches include social constructivism, situated cognition and learner-centredness. From these perspectives, learning in a virtual learning community should be collaborative and interactive, providing relevant activities that focus on learner needs.

Brown and Adler (2008) claim that perceptions about education and how people learn are fundamentally changing from Cartesian "I think therefore I am,'" to social "We participate, therefore we are" (Para 9). From this perspective, community and learning are inseparable. Emerging social software promotes constructivist learning by facilitating a degree of synchronous and asynchronous communication, collaboration and learner-learner interaction not previously possible. Dewey (1897) provided some early insights regarding the theory of social constructivism in which learning is viewed as a social act (Palincsar, 1998). "I believe that all education proceeds by the participation of the individual in the social consciousness of the race... I believe that the only true education comes through the stimulation of the child's powers by the demands of the social situations in which he finds himself. (p. 77)" Piaget (1950) formalized the theory of constructivism where learning results from interacting with the physical environment and assimilating new experiences into pre-existing cognitive structures (Grabinger & Dunlap, 1995). Like Dewey, Vygotsky (1962) emphasized the importance of a social context for learning. The theory of situated cognition builds on this, suggesting that learning results from activities, contexts and culture that are authentic (Brown, Collins & Duguid, 1989). Although learner-centred approaches emphasize individual "needs, skills, interests and backgrounds" (Uribe, n.d., p.1), they are informed by social constructivism and situated

cognition and therefore advocate relevant learning contexts that are characterized by collaborative inquiry and authentic activity (Murphy, 2003; Uribe, n.d.). Murphy (n.d.) used a collaborative inquiry approach to visually document the benefits of learner-centred technology mediated learning such as relevant contexts and authentic activities. Emerging technologies may facilitate integration of different theories to improve learning experiences. (Beldarrain, 2006).

Instructional Design Considerations

The design and implementation of these interfaces carries implications for pedagogy. Mcloughlin (n.d.) asserted that K-12 virtual learning communities should be learner-centred and promote increased levels of learner involvement and control. Research-validated learner-centred psychological principles can provide a "framework for the systemic redesign of [K-12] education" (McCombs, 2003, p.1). Consistent with participatory learning environments, learners should have significant input into their learning environments. "As technology becomes an integral part of our classrooms and schools, educators can look to the students…to help make the shift to more student-centered learning" (Tapscott, D. 1999, p.1).

The need for social interaction and online connectivity is driving the development of new approaches to teaching. These approaches need to take into consideration increased mobility among learners (Beldarrain, 2006). Childress and Braswell (2006) suggested that as massively multiplayer online role playing games (MMORPGs) improve they will inspire new teaching models that will focus on social problem solving approaches. Although similar in most ways, a multi-user virtual environment is a type of MMORPG that is not used solely for entertainment purposes (Wieneke, Nutzel & Arnold,

2007, p.2). Stuckey and Barab (2007) focus on a community-focused approach to MUVE design. Burell (2008) discussed the possibility for a new model for collaboration and problem solving where teachers work as connectors or facilitators in global learning communities.

There are many design considerations for the development of K-12 virtual learning communities. Suggestions are made in the literature regarding the importance of elements such as social presence, interactivity, engagement and collaboration in constituting successful VLCs. According to Stuckey & Barab (in press) K-12 virtual learning communities are emergent rather than prescriptive in nature because they differ so vastly in purpose, content, context, and learner age and ability levels and in the real space contexts in which they reside. These environments should be socially responsive, value-sensitive, and participatory by design and should be flexible to account for teacher-student and student-student interaction (Barab et al, 2007; Stuckey & Barab in press; Beldarrain, 2006). McCombs (2003) identified the emergent nature of teaching and learning in a learner-centred context, where it is primarily the interaction between teachers and students as well as a shared understanding and development of goals that sets the stage for successful learning. In such a context, teachers engage in the learning process with their students while helping them acquire necessary knowledge.

According to Nippard & Murphy (2007), social presence is a core element of K-12 virtual learning communities that can be equivocated with visual and non-verbal indicators typically exhibited in face-to-face learning communities in terms of how participants express themselves socially through the medium. It is not synonymous with interaction, which can simply be the completion of a task and does not indicate socio-

emotional attitudes (Nippard & Murphy, 2007). Garrison (1997) defined social presence as “the degree individuals project themselves through the medium” (p.6). Effective VLCs encourage the emergence of social presence with the underlying assumption that there is a connection between learning and relationship building. Turvey (2006) corroborated this by stating that authentic learning, identity building and socialization are inextricably connected. Nippard and Murphy (2007) conducted a single case study to examine social presence, as exhibited by teachers and students, in a virtual secondary classroom. Findings indicated that teachers and students differed in their preference for communication tools when manifesting social presence. Student manifestations of social presence typically occurred in digression from curricular topics. This finding has significant implications for VLC design as providing opportunities for informal communication could serve to promote and sustain manifestations of social presence, which in turn could provide higher levels of cognition.

Interactivity is an important element in successful K-12 virtual learning communities. Four kinds of interaction typify these learning environments: student-student, student-teacher, student-content and student-tool (Moore as cited in Murphy & Coffin, 2003; Murphy & Coffin, 2003). Successful VLCs are interactive, engaging, and should provide ample opportunities for communication and collaboration. Virtual learning communities should provide opportunities for peer interaction apart from large group interaction (Stuckey & Barab, in press). The challenge is to foster and facilitate interaction among learners and not just between learners and technology (Barab, MaKinster, & Moore, 2001).

K-12 virtual learning communities should be engaging for the learner, providing

ample opportunities for communication and collaboration. Murphy and Coffin (2003) made a distinction between interaction and collaboration, stating that collaboration is "more than interaction" (p. 1). Murphy (2004) defined collaboration as sharing goals and production of shared artefacts. She delineated how collaboration is achieved and manifested by identifying a seven stage continuum from interaction to collaboration. An associated element is the fostering of problem-solving skills. To promote collaboration and problem solving skills, higher level processes should be explained and employed and appropriate scaffolds should be put in place. Engagement also surfaces as an important element in K-12 VLCs. Herrington, Oliver & Reeves (2003) stated that "learner engagement is paramount to learning success" (p. 9).

Successful K-12 virtual learning communities have appropriate boundaries, allow and plan for digression, are well facilitated, manage communication (particularly as complications arise), and promote a level of commitment. They are inclusive, accessible, and flexible. These virtual communities are also extensible in that they can extend into the real space communities in which they reside (Stuckey & Barab, in press). As well, VLC designers plan for technology, manage tools and harness technology to serve the community (Murphy, 2005; Nippard & Murphy, 2007; Ravitz, 1997; Stuckey & Barab, in press).

Communication Tools

The primary goal in using web-based communication tools is to maximize affordances and minimize constraints (Murphy & Coffin, 2003). First generation web-based communication tools emphasized individuals and their experience and interaction with content whereas second generation tools, often referred to as Web 2.0 are combined

in various ways to form social network services that cater to the user and support social learning (Beldarrain, 2006); McLoughlin & Lee, 2007; Parker & Chao, 2007). Associated tools such as blogs and *Wikis*™ are characterized by their ability to foster and facilitate online social networks that are dynamic and interactive, providing unprecedented opportunities for virtual collaboration and community building (O'Reilly, 2005; Alexander, 2006).

Communication tools for virtual learning communities are varied and may include broadband tools such as video and audio conferencing. Communication and management tools may be combined in a variety of ways. Tool selection will be influenced by the purpose and type of VLC. Variables affecting selection of tools are accessibility, expertise, and affordability. The primary consideration should be whether they help learners to achieve their goals (Murphy & Coffin, 2003).

Web 2.0 is a concept that can refer to current principles of and applications on the Internet as they pertain to online social interaction (O'Reilly, 2007). It offers a wide variety of social software tools that provide novel communication environments. Virtual community building tools, including multi-user virtual environments, blogs and *Wikis*™ hold promise for the development of effective virtual learning communities. Potential can be realized with these tools because they provide platforms for publishing content, connect users to each other, are accessible and convenient, can be used synchronously or asynchronously, can be used in combination and are available at little or no cost (Beldarrain, 2006).

Communication technologies have been employed in a variety of ways to include students in participatory approaches to virtual learning communities. Although there are

an abundance of examples, for the purposes of this review, I will discuss how communication tools are being implemented and integrated only in the educational MUVE, *Quest Atlantis*™. *QA*™ is designed for elementary aged students and provides participants with learning opportunities, educational tasks and communication tools to facilitate communication and collaboration. Quest Atlantis uses the synchronous online chat and telegram (i.e., "Instant Messaging (IM)" tools). Chat is used solely as an IM tool. Telegram can be used as an IM tool synchronously or asynchronously because the telegram remains in the recipient's inbox until he or she has a chance to read it. The email, bulletin board and weblog tools in QA operate identically as the same tools in other contexts. The unique aspect of the weblogs in QA is that they feature "posts" by the in-world fictional characters (avatars that are part of the underlying story of QA and that do not represent real people), to which QA users can respond to through their avatars.

Changing Roles for Teachers and Students

The technological revolution has the potential to radically affect traditional, alternative and distance education pedagogy. Emerging learning theories, such as social constructivism and situated cognition, combined with the increased frequency and growth of virtual learning communities provide challenges to the traditional role of the teacher. Relationships between teachers and students will continue to change as VLCs become focal points for learning and educational interaction. Teachers will likely find students increasingly combining leisure and school related virtual activities (Blaisdell, 2006). These changes do not diminish but rather emphasize the importance of the teacher in successful virtual learning communities (Murphy & Coffin, 2003; Nippard & Murphy, 2007; Turvey, 2006). Traditional roles are changing quickly but practise is not reflecting

this reality. Tapscott (1999) stated that "…a whole generation of teachers need[s] to learn new tools, new approaches, and new skills." (p.6). Prensky (2001b) suggested that educators change their methodology and content to address the needs of the new generation of students. Instructional approaches are shifting from teacher-centric to learner-centric due largely to the introduction of learner-centred principles (Mcloughlin, n.d.). The primary role of the teacher in a VLC is to integrate, build, sustain and set the climate for the community. Included in this community design role are promoting and modeling engagement, collaboration and interactivity among learners, as well as selecting and managing communication tools. For instance, integrating multi-user virtual environments requires that the teacher become more involved as a guide in the process of inquiry, in facilitating discussions, creating collaborative learning groups, and in preparing students ahead of time to increase success and engagement (Lim, 2006).

Downes (1998) argued that although the field is constantly and rapidly evolving, trends can be identified and future implications derived. Although much of his speculation has indeed come to pass in the adult sector, the formal K-12 sector remains largely unchanged. Organizations are obliged to support teachers in becoming more adept and knowledgeable about emerging technologies (Coffman, 2004). Professional development, particularly in the form of VLCs is suggested to help teachers manage the transition and their changing roles (Coffman, 2004).

Discussion

There are numerous contexts and ways to build K-12 virtual learning communities and although there are defining features of K-12 VLCs, there is a lack of unity in understanding this phenomenon. Some suggest development of standards in this

entire area in the form of online learning program frameworks, while others suggest development of glossaries to promote common understanding and shared meaning. Many additional questions arise that can act as fodder for further investigation. Research is limited but is rapidly expanding to include many issues that have arisen pertaining to theory, definition, characteristics, value and pedagogy.

Debates regarding how to effectively incorporate technology into educational settings continue as attempts are made to use virtual learning environments to positively effect change in education (Shareski, 2008). Optimism abounds in the literature about the exciting opportunities and transformational possibilities for K-12 virtual learning communities. Stuckey & Barab (2007) alluded to the transforming power of web-supported communities. K-12 virtual learning communities can be used for developing communication skills, sharing ideas and enhancing the development of identity in a world permeated by communication technology. It is evident that technology and learning theory are constantly evolving and can complement one another in ways that have the potential to inform, influence and transform educational practice.

Chapter Three Research Design and Methodology

One's destination is never a place but rather a new way of looking at things.
~Henry Miller (in Litera)

Research Design

I conducted a case study using the *Quest Atlantis*™ environment with my students to depict and conceptualize manifestations of social presence. This type of qualitative research allows for adaptations to the research design as the data collection in the study progresses (Gall, Borg & Gall, 1996). A qualitative study was preferable to me as I wanted to understand how the virtual world in which the participants were involved influenced the participants, that is, how it affected their behaviour and specifically their communication patterns. The case study approach allowed me to look for unanticipated phenomena that would arise in this context, allowing them to emerge during the study. As well, I wanted to analyze the experiences of participants and arrive at comprehensible, useful results.

A single-case study design, with nine participants, allowed me to examine several instances of social presence, thereby providing a rich qualitative data set. I chose the case study approach because I was "interested in insight, discovery, and interpretation rather than hypothesis testing." (Merriam,1998, p.10). Themes examined were the elements of social presence, namely *affective*, *interactive* and *cohesive* components.

Research Methodology

The Participants

My sample was comprised of nine students from the school at which I was both administrator and teacher. This sample represented most of the multi-grade class. The

oldest was not asked to participate as she was above the appropriate age limit specified by *Quest Atlantis*™. The participants ranged in age from 8 to 13. Six participants were males, two aged eight, one age 10, one age 11 and two aged 13. Three of the participants were females, aged 10, 11 and 12 respectively.

I purposefully chose my sample population based on their experience as students in the school in which I taught. I had been their teacher for almost three years so they were familiar with me, with each other and with the school. Two months prior to my study I received appropriate teacher training in QA and opened up a class for my students in QA. The students were, therefore, relatively new to the environment at the beginning of my study.

The purpose for participation in *Quest Atlantis*™ was both educational and social. All of the participants were new to QA and all had "quests" that they needed to complete as part of their school work. *Quest Atlantis*™ focuses on providing users with educational, entertaining and socially responsible activities and employs various communication tools that allow users to communicate and collaborate with each other. As a teacher I entered my students in QA so they could benefit from all three types of activities, and their participation was compulsory. Although the cognitive elements are worthy of examination, as a researcher I chose to analyze their communication in the world which was voluntary on their part. I do not deem the social to be more important than the cognitive aspects; I was simply more interested in investigating manifestations of communication. Further investigation could reveal whether a positive social experience could be a precursor for increased cognition.

The Researcher

My role as researcher in this case was with an insider's perspective because I was not only the teacher of the participants and thus a participant in *Quest Atlantis*™ but also I had known the students and their families for several years. Because of my participation as a teacher in QA, as well as my position as teacher of participants, I was better able to understand the participants' viewpoints. Knowing the participants and their families well meant that I had a lot of information about them, which gave me biases but also provided me with depth of insight. I could be biased favourably toward some students and unfavourably toward others based on previous or current interactions with them outside of the research context. I might have misinterpreted student comments based on personality differences or on my previous thoughts about that student which in turn could have caused me to code and draw conclusions that were faulty. On the other hand, I may have interpreted some students' comments better than others because of my understanding of those students in which case my coding and conclusions would have been more accurate. As their teacher and friend of the students` families, I could have expected certain communication behaviours or answers in the interviews that may have put undue pressure on the participants. I could have gender stereotypes and expectations that I am not aware of. Also, I feel that changes are necessary for K-12 education and as a result I had positive expectations for Quest Atlantis.

Although I did have biases because of my prior knowledge of and interactions with the participants and I did not have an independent coder going through the transcripts to confirm my decisions, I think my approach to coding was reliable and valid. I have confidence that this is the case, first, because my analysis was not completely

emergent as I had the instrument with corresponding definitions to guide my coding. Also, I was very familiar with my participants and so although that also made me biased, I was more easily able to discern ambiguous comments. Also, I triangulated my data sources to increase the amount and richness of data and therefore increase reliability of results. I outlined the process I followed from my research questions to raw data and through to my findings as well as provided examples of how I coded units of analyses. I used numerical analysis to corroborate my findings. Finally, I have been honest and upfront in presenting my biases as well as the context and conditions for my study.

The Study Environment

The entire study was conducted virtually. As mentioned earlier, *Quest Atlantis*™ is a holistic virtual learning environment that synthesizes educational, entertaining and socially responsible activities and can be integrated into existing classes. The school in which I was teacher and the participants were students has a focus on virtual learning trips and experiences so I was able to integrate QA into the existing learning environment. Although I was their full-time teacher, as a researcher, I observed and examined student communications in *Quest Atlantis*™ during formal and informal QA sessions**.** These observations were in the form of asynchronous document analysis. Interviews with participants were conducted at a distance in real time.

Theoretical Framework

The Community of Inquiry (COI) model (Rourke et al. 2001) was my theoretical base for collecting and interpreting the data on social presence. This model is grounded in the work of Dewey and in constructivism (Garrison, 2007) and uses pedagogical

principles to promote critical thinking in the context of computer conferencing, specifically with communities of learners at the post-secondary level. (Rourke, Anderson, Garrison, Archer, 2000). According to the authors of this model, any high quality educational experience must be comprised of the three central elements of the Community of Inquiry model, namely, cognitive presence, social presence and teaching presence (Garrison, Anderson & Archer, 2000). Although it is primarily the interactivity between the three that ultimately determine success, the presence of any one of these three indicates, at least partially, the potential for a successful Community of Inquiry. My study focused on the social presence element of this model. Garrison et al. (2000) defined social presence as "the ability of participants in the Community of Inquiry to project their personal characteristics into the community, thereby presenting themselves to the other participants as 'real people'" (p.3) and later as "the ability to project one's self and establish personal and purposeful relationships" (Garrison, 2007, p.3).

Garrison, et al. (2000) outlined three categories of social presence: emotional expression, open communication and group cohesiveness. Each category contains associated indicators. Rourke, Anderson, Garrison, and Archer (2001) further refined these categories and indicators, adding definitions and examples. The instrument they developed was used to guide my data collection and analysis.

The Method

Rourke et al.'s (2001) instrument was used to guide the design of my study as well as the interpretation of the data (see Appendix A). Document analysis methodology was used to interpret the data obtained from *Quest Atlantis*™ transcripts and interviews with participants. In both cases, all synchronous and asynchronous interactions were

automatically captured and recorded by the appropriate computer conferencing tools. The categories and indicators contained in the instrument developed by Rourke et al. (2001) were used to organize and interpret the data.

Rourke et al.'s (2001) instrument provided a salient, relevant and appropriate framework for my study. However, the broad context for which it was created, that is, asynchronous, non-graphic, online learning communities, is limited in scope given technological developments such as those found in multi-user virtual environments. For example, customizable avatars, simulated real world environments and built in capacities for instant messaging. Although the three main categories; *affective*, *interactive* and *cohesive* were useful for categorizing during my analysis phase, I realized that much of the message content did not easily fit into the existing instrument. In order to make better sense of the data, I refined some indicators and created some new indicators within the pre-existing categories.

There were several quotations that contained designs and patterns using various keyboard functions. For example **"""""""""""""""""""" .....** <><><><><><><><><><> ********** P.S. do u like the designs?" (F4 email). These seemed *affective* in nature, possibly designed to elicit emotion in the recipient, but were not described by pre-existing *affective* indicators. Rather than discard this data the indicator "creative expression" was created for my study.

Many of the quotations made the visual nature of *Quest Atlantis*™ obvious. This visual aspect seemed important and worthy of specific notation. The three "visual" indicators that were added to the *interactive* category were: "visual acknowledgement", "visual interaction", and "visual self-awareness". "Visual acknowledgement" addressed

text that indicated visual recognition of others in the environment. For instance, “k NOW I c u! I like ur clothes!” (F4 telegram). “Visual interaction” addressed occasions when participants were telling others where items were, seeing the same objects and doing things together as they would in real space such as “its also by the dressers and the fireplaces” (F5 chat). “Visual self-awareness” addressed quotations that evidenced awareness of the avatar as an extension or representation of the participant such as “and i was stuck in the flowers lol!” (M1 chat). Occasionally participants made statements such as “there is 0 people in OTAK hub!!!!!!” (F4 email) that did not identify a specific recipient and had no apparent purpose other than possibly trying to obtain a reaction. These were of interest as in real space situations, these comments were not likely to have been made. The indicator “making a statement” was created for the *interactive* category.

In some cases quotations addressed questions and issues by assisting and providing relevant guidance to others. These included helping others to obey rules, reprimanding and giving directives. For example, “now let’s not get 2 2 deep into a conversation cuz we don’t want 2 break the I-BURST rules!” (F4 chat). Therefore the indicator “directional” was added to the existing *cohesive* category.

I took the indicator “continuing a thread” and broke it into two indicators; “continuing a thread/replying” and “starting a thread” as there was no pre-existing indicator that addressed quotations that started a thread. Similarly I took the indicator “Self-disclosure” and broke it down into “Self-disclosure/in-world” to address quotations such as “And 2 answer your question I change my clothes A LOT!” (F5 email) that contained information about life inside *Quest Atlantis*™ and “Self-disclosure/outside QA world” to address quotations such as “my fave teams in the nfl are the Eagles and the

Colts, I guess." (F5 chat) that contained information about life outside of *Quest Atlantis*™. I made this decision because there was no application with this indicator for in-world self-disclosure. With many indicators I took the existing indicator, along with its definition, and added some levels of description. I used the indicators "quoting from others' messages", "expressing agreement" and "phatics, salutations" as they were.

Data Collection

Data were collected from a variety of sources in order to corroborate findings and increase the quality and rigor of my research. Informal observations, transcript analysis and standardized open-ended interviews with students were all sources of data. A reflective journal and field notes were updated regularly and used to inform data analysis. Informal observations were conducted in real *Quest Atlantis*™ time with each of the participants and occurred naturally as I was involved with participants regularly as their teacher. All QA in-world text based communication data related to social presence was collected for analysis. These included chat, email, telegrams, and bulletin board postings. Telegrams and chat were recorded on chat logs and email communications were recorded in "sent" and "inboxes". *Quest Atlantis*™ recorded all communication electronically for any teacher or researcher to access, so this was a rich and reliable source of data for my study. At the conclusion of the QA session, I also conducted an interview with each student to give them a chance to express their opinions about QA in their own words.

Data collection occurred over a period of six weeks and, although guided by the instrument developed by Rourke et al. (2001), was emergent as the study was characterized by "discovery of new relationships, concepts, and understanding, rather than verification or predetermined hypotheses" (Merriam, 1998, p. 13). I interviewed

each of the nine students once during the study using the Instant Messaging (IM) tool Skype. Awareness of being recorded, as well as needing to type the answers may have hindered more in depth responses from participants. The interviews lasted approximately 30 minutes and were standardized in that I asked the same questions of each participant and open-ended because participants were not given answers from which to choose but rather answered in their own words. To minimize bias, I asked a series of the same questions in the same order, of each student. In some cases I asked additional open-form questions to probe for further information and to allow for more flexible and spontaneous responses.

Data Analysis

Data analysis was conducted using an interpretational analysis and was guided by Rourke et al.'s (2001) explicit category system, which contained three central themes of social presence: *affective*, *interactive* and *cohesive*. In addition, I used my intuition and judgment to group and interpret the coding segments. Using my research questions as a foundation for the study, and Rourke et al.'s (2001) instrument, I organized and coded the raw data from my reflective journal, *Quest Atlantis*™ transcripts, and student interviews. Transcripts were imported into AtlasTi, a qualitative analysis program, where units of meaning were coded and coding segments were analyzed. I then applied numerical and interpretational analyses to identify manifestations of social presence.

To analyze the effectiveness of the telegram, chat and email tools as vehicles for manifestations of social presence, I looked at frequency of student posts, posting length, message recipient and tool preference. I examined the raw data, distilled it to individual student posts and categorized this data according to telegram, chat and email. To find out

how often students posted, I counted the number of posts within each tool. I then counted the number of words in each posting to determine content volume. To analyze who students communicated with, I further classified the data for all three tools into recipient categories: class, non-class and teacher. I added a non-specific category for chat posts for those postings that had no specified recipient. I synthesized my findings and used them as a foundation for the development of a description of participant experiences.

Ethical Considerations

Quest Atlantis™ is not only a MUVE but also an ongoing research project, so, students submitted a parental consent form to me and I obtained additional parental consent and student assent for my research. The only selection criterion was that they were students in my school.

I knew the participants and their families well, so there was an established trust relationship between myself and the participants. Also, my positional power with the participants as their teacher put them in a dependent relationship with me. So, to ensure that they did not feel pressured or coerced into taking part in the study and that they would not be penalized for participating, not participating or withdrawing, a document outlining participant freedom and releasing participants from all expectations in this regard was given to participants. Also, I was sensitive to watch for cues from participants that may have indicated a desire to withdraw. I established and maintained a positive relationship with all participants during my study and was careful to communicate frequently with those involved.

Chapter 4: Results

The illiterate of the 21st century will not be those who cannot read and write, but those who cannot learn, unlearn and relearn. ~Alvin Toffler (in Rosenberg)

Introduction

The modes of data collection used for this study were document analysis and semi-structured interviews. While both of these were relevant and important sources of data, the document analysis proved to be the richest data source. Transcripts from chat, telegram and email within *Quest Atlantis*™ for each of the nine participants, were collected and coded according to Rourke et al.'s (2001) instrument (see Appendix A). Themes emerged past the original instrument during data analysis as quotations arose that were not described by any of the indicators in the existing instrument. A descriptive analysis of the data derived from the documents yielded some interesting findings that I incorporated into the qualitative analysis of the documents. Data collected from the semi-structured interviews was integrated into the document analysis findings.

Themes in this study fell into the three major categories included in the instrument: *affective*, *interactive* and *cohesive*. Within each category, data were coded according to indicator and based on the descriptions provided in the instrument. Although the instrument I used was helpful, salient and relevant for my study, it was created for post-secondary students so in some instances I needed to refine the instrument definitions to make them more operational for the context (MUVE) and participants (elementary aged students) of my study. In these cases, the indicator names remained intact. In a few cases I created new indicators to accommodate the data. I will explain my judgments and how they helped make sense of the data later in my discussion.

The findings are discussed in relation to my research questions and according to each of the three major categories. In each category I provide an overall look at the descriptive data in the form of a table and then break the findings down according to each indicator. I present the descriptive data that correlates to the indicator, the instrument and operational definitions, some charts, and a discussion of the findings, including relevant quotes from the participants.

Initially, I was not analyzing the data for gender differences. However, during data analysis, significantly different communication patterns emerged between the two groups.

Analysis

In this section I present each research question separately and then the associated research findings. Analysis of the *Quest Atlantis*™ transcripts and interviews revealed that participants manifested social presence in the context of Rourke et al.'s (2001) *affective, interactive* and *cohesive* categories and through their choice of QA communication tools. First, I display combined posting frequency results for all students. Then, the results are displayed according to the *affective, interactive* and *cohesive* categories. Finally, results for student use of *Quest Atlantis*™ communication tools are displayed. See Table 4.1 for a summary of Rourke et al.'s (2001) categories, indicators and condensed descriptions. The indicators and descriptions added for this study are italicized and preceded by an asterix. There is a variance of ranges on the Y axis of the histograms displayed in this section. A common scale for the Y axes was not used as some of the data would not be visible.

Table 4.1

Categories, Indicators and Descriptions

Category	Indicator	Description
Affective	Expression of emotions	Conventional or unconventional expressions of emotion.
	Use of humour	Teasing, cajoling, irony, understatements, sarcasm
	Self-disclosure (in-world)	Presents details of life or expresses vulnerability
	Self-disclosure (outside QA world)	Presents details of life or expresses vulnerability
	**Creative expression*	*Use of various keyboard tools and features in an unconventional way, including but not limited to patterns and designs*
Interactive	Continuing a thread/replying	Using reply feature of software rather than starting a new thead
	Quoting from others' messages	Using software features to quote others' entire message or cutting and pasting selections of others' messages
	Referring	Direct references to content of others' posts
	Asking questions	Students ask questions of other students or the moderator
	Complimenting, appreciation	Complimenting others or contents of others' messages
	Expressing agreement	Expressing agreement with others or content of others' messages
	**Starting a thread*	*Using QA chat, telegram or email tools to start a thread*
	**Visual acknowledgement*	*Using text that indicates visual acknowledgment or recognition of others in the environment.*
	**Visual interaction*	*Telling others where things are, seeing the same things and doing things together like they would in the real world*
	**Visual self-awareness*	*Evidence of an awareness of*

Category	Indicator	Description
		the avatar as an extension or representation of the participant
	**Making a statement*	*Statements that are made to no one in particular, are not responding to another post nor obviously starting a thread*
Cohesive	Vocatives	Addressing or referring to participants by name
	Inclusive	Addresses the group as *we, our, us, group*
	Phatics, salutations	Communication that serves a purely social function; greetings, closures
	**Directional*	*Addressing questions and issues from others, whether directly asked to or not by assisting and providing relevant guidance for them.*

The charts below show the combined student posting frequencies in all three categories. Figure 4.1 reflects the total posting frequencies of all nine students. Figures 4.2 and 4.3 reflect the male and female student total posting frequencies. Within each chart, the total number of postings is listed, along with the corresponding percentage.

Combined Posting Frequency Results for all Students

Of the 7700 student postings, 48% were coded as *interactive*, 28% as *affective* and 24% as cohesive (See Figure 4.1).

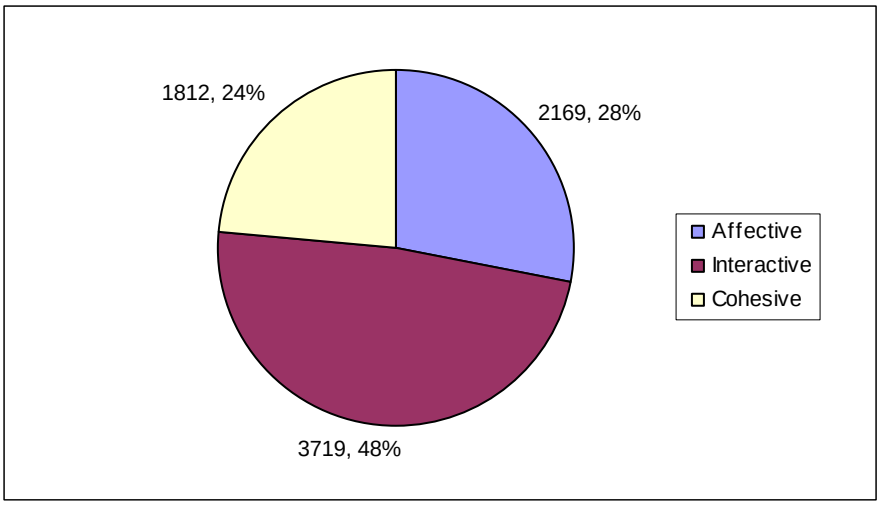

Figure 4.1. Compiled student posting frequencies according to social presence category.

Of the 7700 total student postings, 477 or 6% were male student postings and 7223 or 94% were female student postings.

Of the total male postings, 15% were coded as *affective* and of the total female postings 29% were coded as affective (See Figure 4.2).

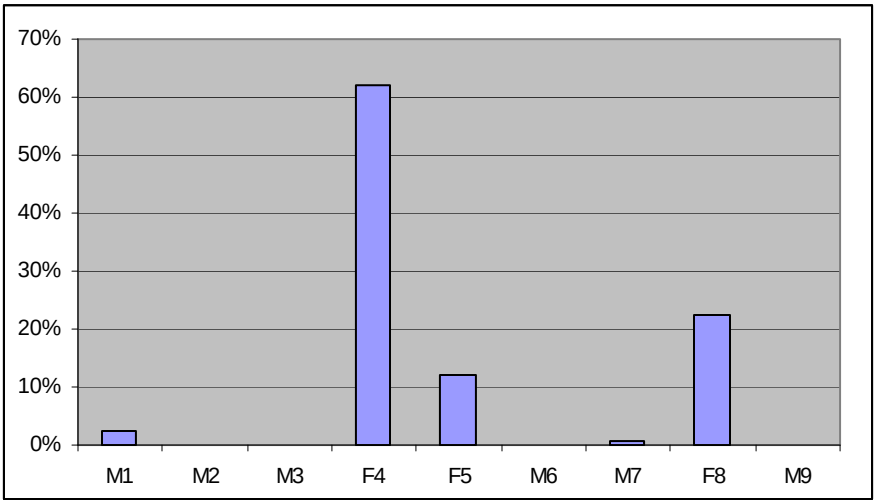

Figure 4.2. Percentage comparison of male and female frequency for affective category.

Of the total male postings, 55% were coded as *interactive* and of the total female postings 48% were coded as interactive (See Figure 4.3).

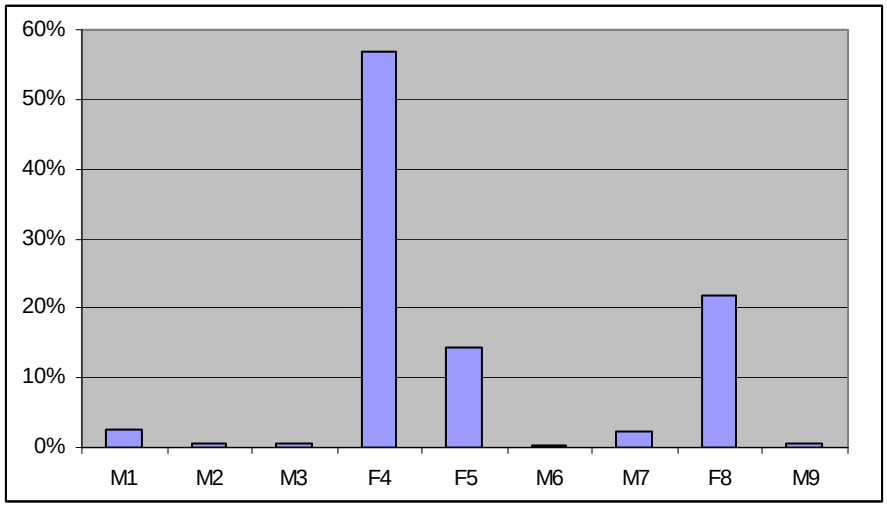

Figure 4.3. Percentage of male and female frequency for interactive category.

Of the total male postings, 30% were coded as *cohesive* and of the total female postings, 23% were coded as cohesive (See Figure 4.4).

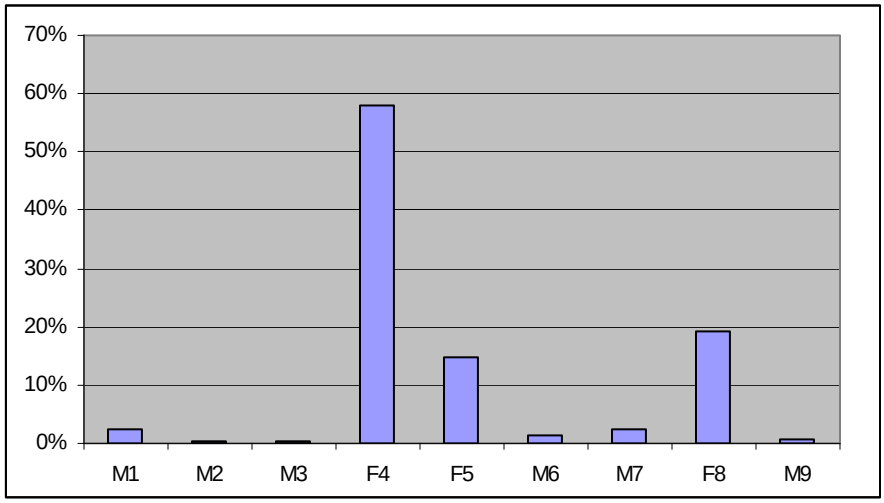

Figure 4.4. Percentage of male and female frequency for cohesive category.

Overall, the female students had significantly higher post frequency than the male students, actually a 9:1 ratio (See Figure 4.5)

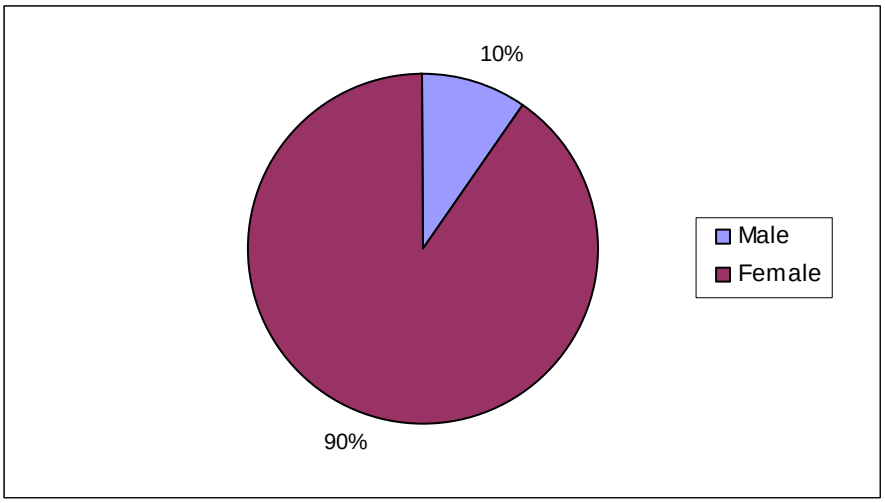

Figure 4.5. Comparison of overall male and female posting frequency.

Results according to Affective, Interactive and Cohesive Categories

The following results are broken down and displayed according to category and indicator. A table is provided at the beginning of each category in which new or modified indicators are separated from existing indicators by a blank row and are italicized. For each indicator in the *affective*, *interactive* and *cohesive* categories, results are displayed as follows: a table that provides a breakdown of student post frequencies according to that indicator, a table that includes descriptions of the instrument and operational definitions as well as supporting examples from the transcripts, raw data for that indicator and, associated charts as visual displays of the data.

Although this study did not focus on gender differences, for the reader's convenience the male student data have been shaded a grey tone in the tables. Also male participants are coded with an "M" in front of the number and female participants are coded with an "F" in front of the number. It is important to note that the gender difference was so pronounced that charts were skewed if all student results were

combined. So, for each indicator, results for males and females are displayed in separate charts.

Analysis of the Affective Category

Results for the *affective* category are displayed in this section and address the research question "Do students express themselves emotionally and if so how?" *Affective* messages accounted for 28% of the message content, second to *interactive* data at 48% and just ahead of *cohesive* data at 24%. Table 4.2 shows, by indicator, the frequency with which students posted *affective* messages. Following that, results are posted separately for each indicator.

Table 4.2.

Comparison of Student Affective Posting Frequency

Indicator	**M1**	**M2**	**M3**	**F4**	**F5**	**M6**	**M7**	**F8**	**M9**	**Total Postings**
Expression of Emotions	6	2	0	856	166	1	9	355	0	1395
Use of Humour	11	0	0	182	35	0	3	56	0	287
Self-disclosure (in-world)	11	0	0	27	13	0	1	8	0	60
Self-disclosure (outside QA world)	22	1	0	118	12	0	3	18	0	174
Creative Expression	0	0	0	161	39	0	0	52	0	253
Total Individual Affective Postings	50	3	0	1344	265	1	17	489	0	2169

Indicator A1: Expression of emotion.

Table 4.3

Results for Indicator A1: Expression of Emotion

Instrument Definition	Operational Definition	Examples from Transcript
Conventional expressions of emotion or unconventional expressions of emotion. Includes repetitious punctuation, conspicuous capitalization, emoticons.	Instrument definition and emphasis on certain feelings, making others feel better or encouraging others, teasing others playfully, exhibiting excitement, attempting to elicit communication from others, or making emphatic statements	1. "yes i REALLY want it!!!!!!!!!!!!!!!!!!!!!!!!!!!!1'" (F4 chat June 22) 2. i am ur friend!!!!!!!!!!!'" (F4 chat June 13) 3. "U R soooooooo weird!!!!!" (F5 email June 11) 4. "SOOOO awsomeeeeee!!!!!!!!!!!!!!!! yayayayayhooooooooo!!!!!!!!!!! wahooo yayhooo yayay wahhhooooooiiieeee!!!!!!!!!! I LOVE KITTENS!!!!!!!!!!!!!!!!!!!!!!!!" (F4 email June 26) 5. "I absulutly LOVE telegraming and e-mailing!!!!!!!!!!!!!!!!!! Don't you??????????????!!!!!!!!!!!!!!!!!!!" (F8 email May 21) 6. "There are GORRILlAS here!!!" (F5 telegram May 15)

Table 4.4

Posting Frequencies for Indicator A1: Expression of Emotion

Indicator	**M1**	**M2**	**M3**	**F4**	**F5**	**M6**	**M7**	**F8**	**M9**	**Total Postings**
Expression of Emotions	6	2	0	856	166	1	9	355	0	1395

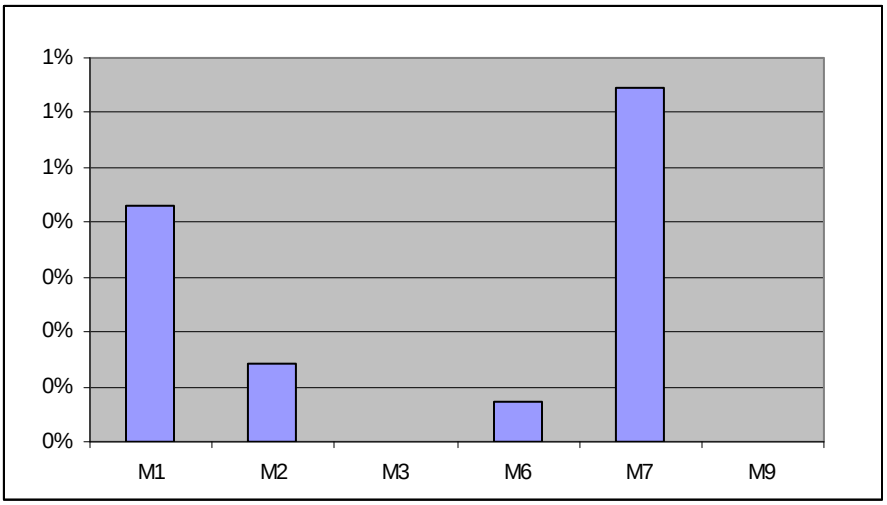

Figure 4.6. Male student posting frequencies for expression of emotion.

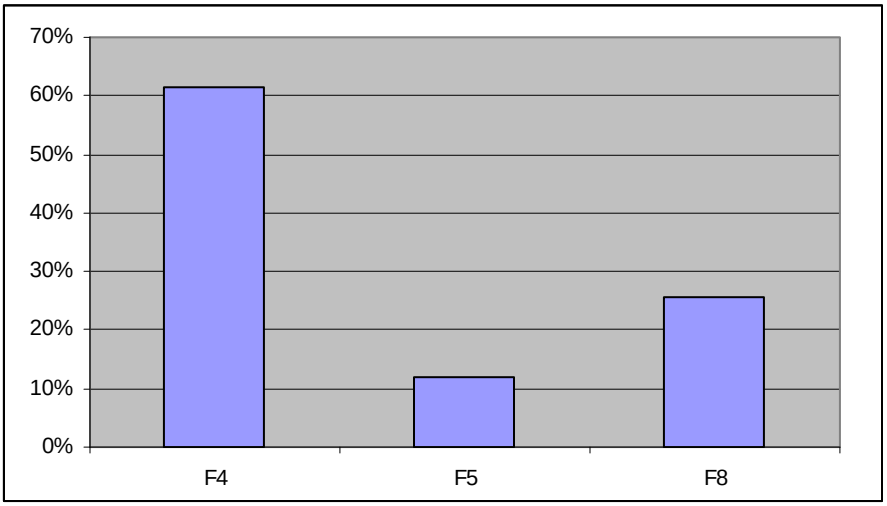

Figure 4.7. Female student posting frequencies for expression of emotion.

Indicator A2: Use of humour.

Table 4.5

Results for Indicator A2: Use of Humour

Instrument Definition	Operational Definition	Examples from Transcript
Teasing, cajoling, irony, understatements, sarcasm	Instrument definition and responses to funny statements, laughing at self, silly or nonsensical statements and making jokes or witty comments.	1. “I am teasing U!!!!!!!!!!!! HaHa!!!!!!!!!!!!!!!” (F8 email June 4) 2. “do u like elllllllleeeeccttttttrrrrrooonnnnniiiiiccccssss or sompthin? LOL!’”(F4 telegram June 6) 3. “First of all U shouldnt re: more than once-eapecially when u R re: ing yourself!!!!!!!!” (F5 email June 5) 4. “and i was stuck in the flowers lol!” (M1 chat June 25) 5. “dljsldjfdkjls'-0975846kjf/,.<>?))&&*^ Don't try to figer out what that means!!!! It does not mean anything!!! LOL!!! just want 2 make this longer!!!” (F8 email June 24) 6. “how can u laugh your head off out loud?” (M1 chat June 25)

Table 4.6

Posting Frequencies for Indicator A2: Use of Humour

Indicator	**M1**	**M2**	**M3**	**F4**	**F5**	**M6**	**M7**	**F8**	**M9**	**Total Postings**
Use of Humour	11	0	0	182	35	0	3	56	0	287

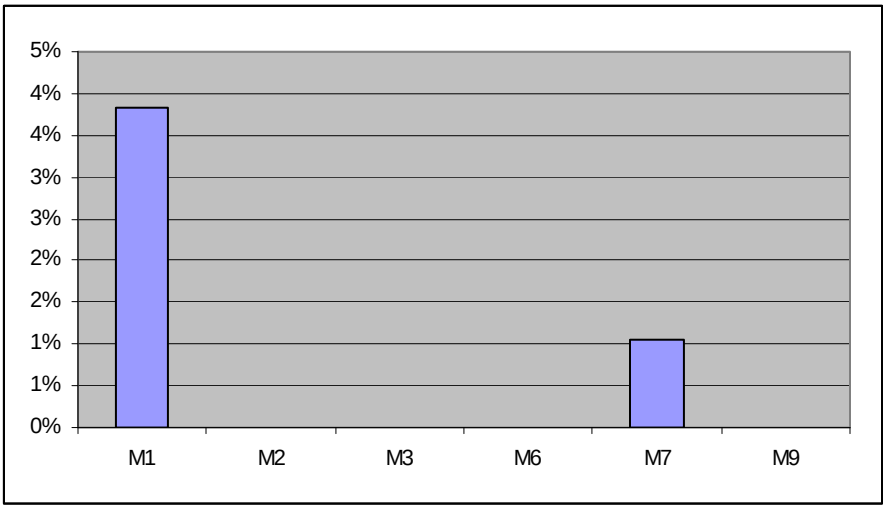

Figure 4.8. Male posting frequencies for use of humour.

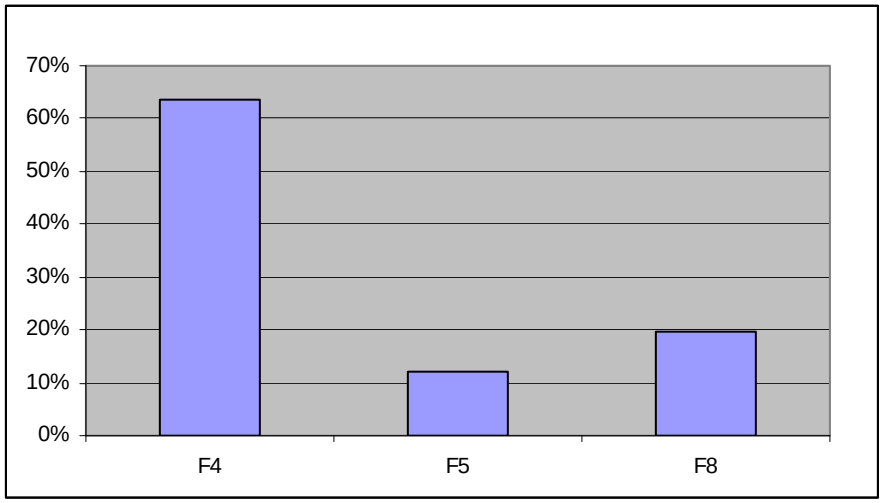

Figure 4.9. Female posting frequencies for use of humour.

Indicator A3: Self-disclosure (in-world).

Table 4.7

Results for Indicator A3: Self-disclosure (in-world)

Instrument Definition	Operational Definition	Examples from Transcript
Presents details of life outside of class, or expresses vulnerability	Presents details of life inside QA or expresses vulnerability inside QA world	1. “Yes no and did you mean "quiet"? if so than I'm quiet and yes I do check my e-mails” (M1 email June 3) 2. “And 2 answer your question I change my clothes A LOT!” (F5 email June 3)

Table 4.8

Posting Frequencies for Indicator A3: Self-disclosure (in-world)

Indicator	**M1**	**M2**	**M3**	**F4**	**F5**	**M6**	**M7**	**F8**	**M9**	**Total Postings**
Self-disclosure (in-world)	11	0	0	27	13	0	1	8	0	60

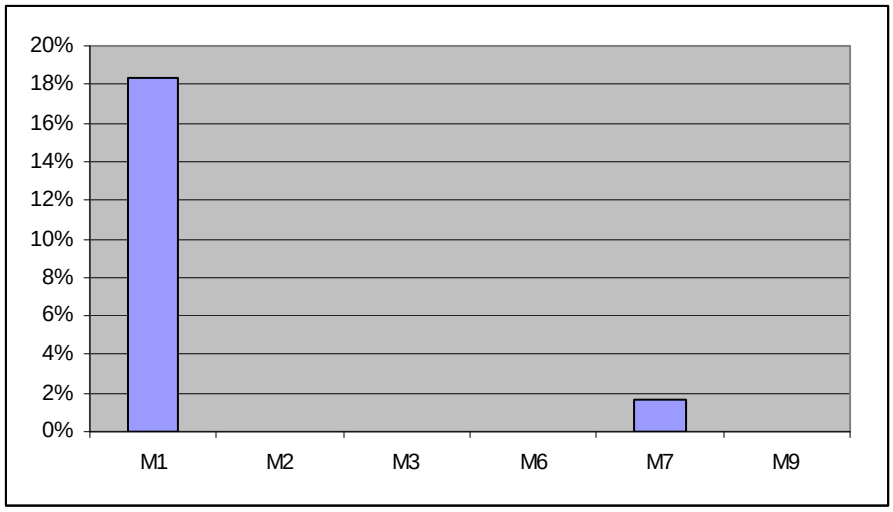

Figure 4.10. Male posting frequencies for self-disclosure (in-world).

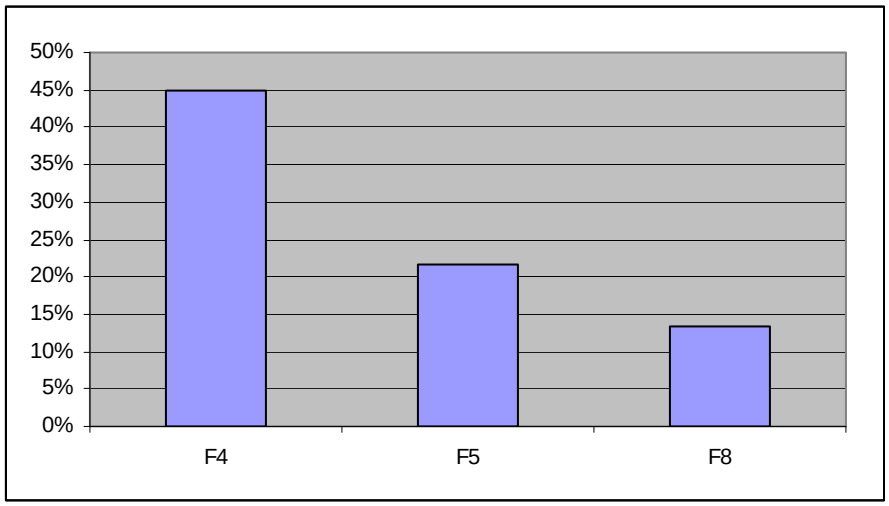

Figure 4.11. Female posting frequencies for self-disclosure (in-world).

Indicator A4: Self-disclosure (outside QA world).

Table 4.9

Results for Indicator A4: Self-disclosure (outside QA world)

Instrument Definition	Operational Definition	Examples from Transcript
Presents details of life outside of class, or expresses vulnerability	Presents details of life or expresses vulnerability outside of QA world	1. “my fave teams in the nfl are the Eagles and the Colts, I guess.’” (F5 chat June 16) 2. “oh, my brother is 12 and he is way 2 tall for his age” (M7 telegam June 27)

Table 4.10

Posting Frequencies for Indicator A4: Self-disclosure (outside QA world)

Indicator	M1	M2	M3	F4	F5	M6	M7	F8	M9	Total Postings
Self-disclosure (outside QA world)	22	1	0	118	12	0	3	18	0	174

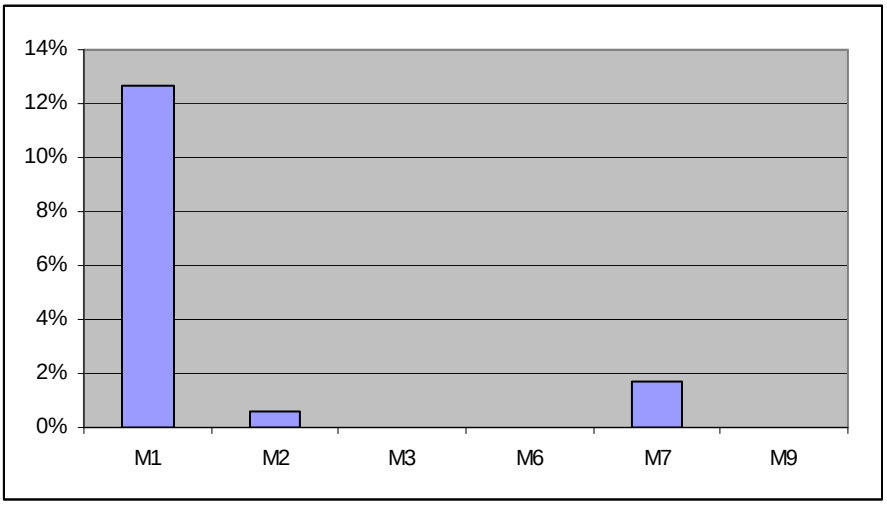

Figure 4.12. Male posting frequencies for self-disclosure (outside QA world).

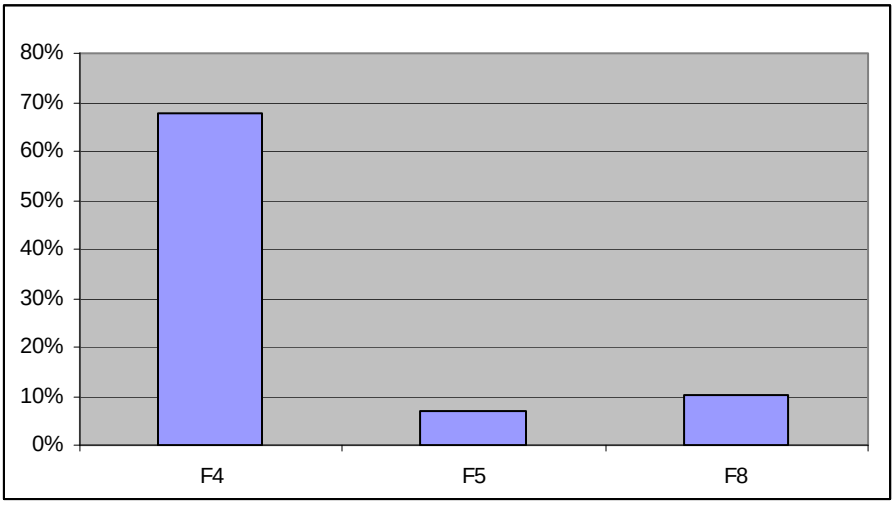

Figure 4.13. Female posting frequencies for self-disclosure (outside QA world).

Indicator A5: Creative expression.

Table 4.11

Results for Indicator A5: Creative Expression

Instrument Definition	Operational Definition	Examples from Transcript
New Indicator	Use of various keyboard tools and features in an unconventional way, including but not limited to patterns, designs, expressing ideas creatively, decorating words and unconventional uses of language such as "l8er".	1. """""""""""""""""""""""""""" ..... <><><><><><><><><><> ********** P.S. do u like the designs?" (F4 email June 2) 2. "hER ARE SOME OF MY FACES----- <_> _/? +_+ ^_^ <_> *_* $_$!_! #_# @_@!!!!!!!!!!!!!!!!!!!!!!!!!!!!!! IIKE EM??????" (F8email June 27) 3. "******&&&&&&^^^^^^^^$$$$$$$$ ######## @@@@@@@@ ??????????? ~~~~~~~~~~ %%%% +++++ ----------swrefxcr ========== (F4 email June 3) 4. "^^^^^^^^^^^^^^YAY^^^^^^^^^^^^^^^" (F4email June 2) 5.":) :(This is a person crying---- :(....." (F8email June 9)

Table 4.12

Posting Frequencies for Indicator A5: Creative Expression

Indicator	**M1**	**M2**	**M3**	**F4**	**F5**	**M6**	**M7**	**F8**	**M9**	**Total Postings**
Creative Expression	0	0	0	161	39	0	0	52	0	253

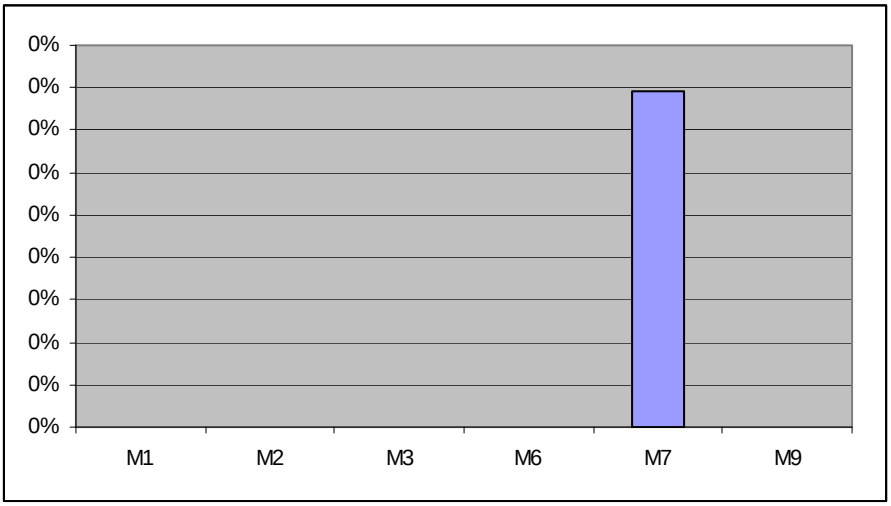

Figure 4.14. Male posting frequencies for creative expression.

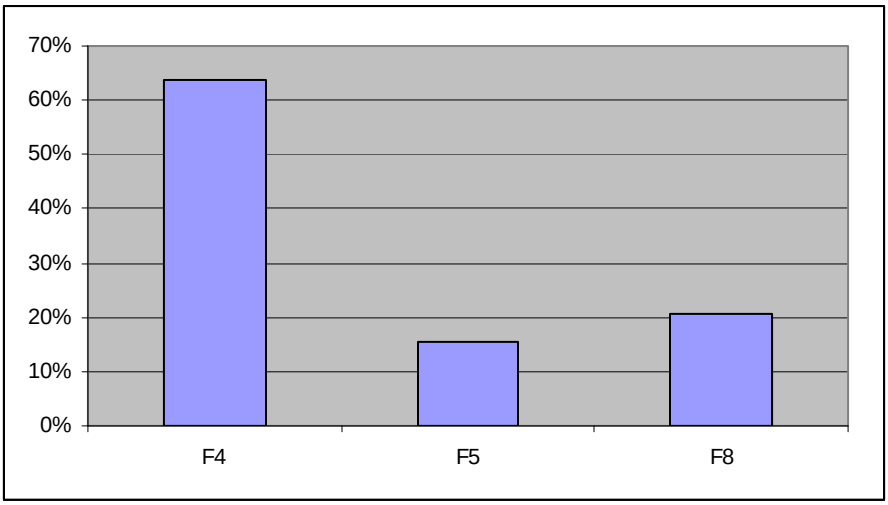

Figure 4.15. Female posting frequencies for creative expression.

Analysis of the Interactive Category

Results for the *interactive* category are displayed in this section and address the question "Do students openly communicate with others in the environment and if so how?" *Interactive* messages accounted for most of the student postings at 48% of the total message content. Table 4.13 shows, by indicator, the frequency with which students

posted *interactive* messages. Following that, results are posted separately for each indicator.

Table 4.13

Comparison of Student Interactive Posting Frequency

Indicator	M1	M2	M3	F4	F5	M6	M7	F8	M9	Total Postings
Continuing a thread/replying	30	6	7	590	132	2	29	205	3	1004
Quoting	0	0	0	5	1	0	0	0	0	6
Referring	0	0	0	15	19	0	1	25	0	54
Asking questions	36	4	2	594	106	5	18	218	5	988
Complimenting, appreciation	7	1	0	215	54	0	3	77	1	358
Expressing agreement	7	3	1	204	54	0	10	43	0	322
Starting a thread	1	0	0	101	17	0	4	54	0	177
Visual acknowledgement	0	0	0	71	11	0	2	17	0	101
Visual interaction	12	6	13	234	116	1	10	116	8	516
Visual self-awareness	2	0	0	18	7	0	4	9	0	40
Making a Statement	4	1	3	72	17	0	8	46	2	153
Total Individual Interactive Postings	99	21	26	2114	533	8	89	810	19	3719

*Note that all students had some postings in this category.

Indicator I1: Continuing a thread/replying.

Table 4.14

Results for Indicator I1: Continuing a Thread/Replying

Instrument Definition	Operational Definition	Examples from Transcript
Using reply feature of software rather than starting a new thead	Using chat, telegram or email tools to reply to a thread (comment, question, etc); general replies, self-disclosure, asking for clarification and providing clarification.	1. “that is a lot! Ionly have 14 lumins and 5 cols!!!” (F5 telegram June 15) 2. “wut do u mean i don't have a lot” (F4 chat June 22) 3. “i've never herd of them” (M7 chat May 19)

Table 4.15

Posting Frequencies for Indicator I1: Continuing a Thread/Replying

Indicator	M1	M2	M3	F4	F5	M6	M7	F8	M9	Total Postings
Continuing a thread/replying	30	6	7	590	132	2	29	205	3	1004

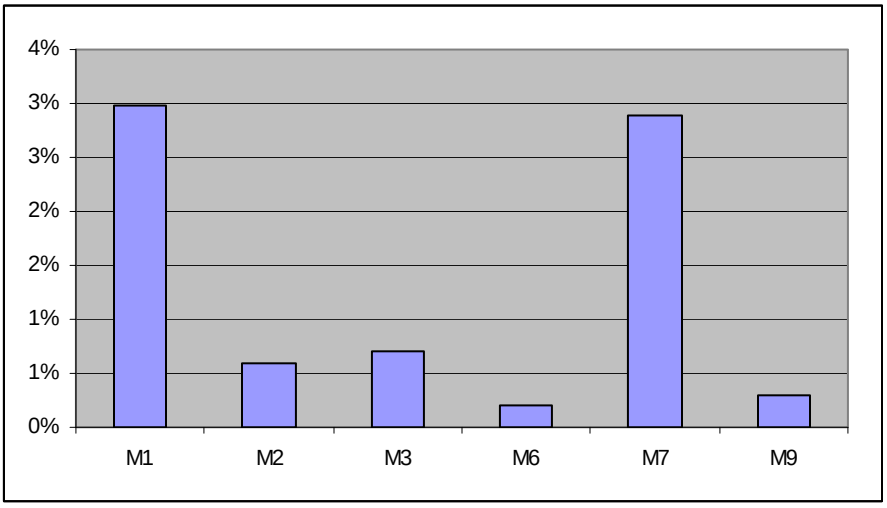

Figure 4.16. Male posting frequencies for continuing a thread/replying.

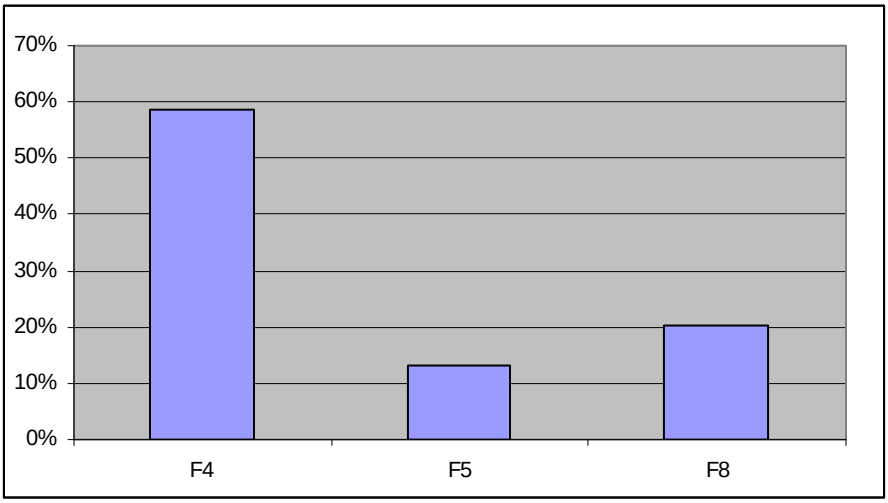

Figure 4.17. Female posting frequencies for continuing a thread/replying.

Indicator I2: Quoting from others' messages.

Table 4.16

Results for Indicator I2: Quoting from Others' Messages

Instrument Definition	Operational Definition	Examples from Transcript
Using software features to quote others' entire message or cutting and pasting selections of others' messages	Instrument definition	1. "wut do u mean "wut should that have been"???"" (F4 telegram June 16) 2. "k i'll tell ya it was"hey!!!!!! i bet u can't wait till the surprise party for u know who!"" (F4 telegram May 16)

Table 4.17

Posting Frequencies for Indicator I2: Quoting from Others' Messages

Indicator	**M1**	**M2**	**M3**	**F4**	**F5**	**M6**	**M7**	**F8**	**M9**	**Total postings**
Quoting	0	0	0	0	0	0	0	0	0	6

*Note that none of the males had postings that could be described by this indicator.

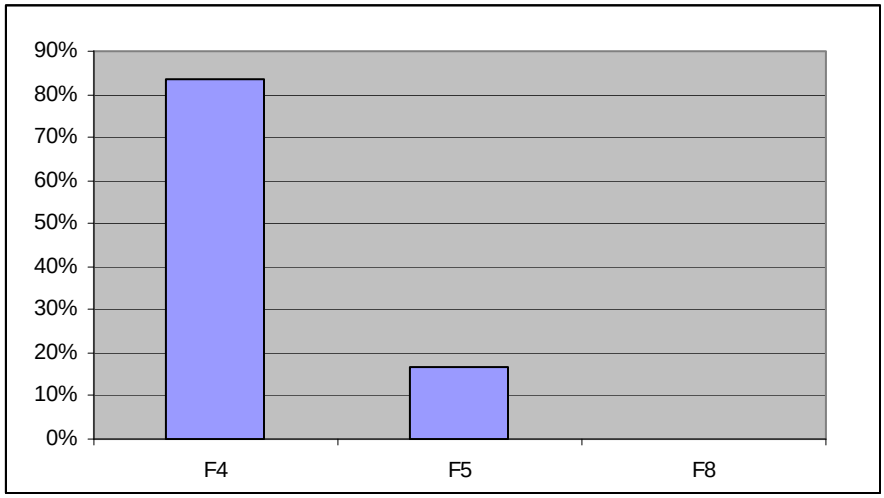

Figure 4.18. Female posting frequencies for quoting.

Indicator I3: Referring.

Table 4.18

Results for Indicator I3: Referring

Instrument Definition	Operational Definition	Examples from Transcript
Direct references to content of others' posts	Instrument definition and quotations in which a student referred to another student who was not directly involved in the conversation.	1. "ya... i think u mentioned thAT u senT thiS E tO everY1!!!" (F4 email June 15) 2. "___ talked 2 her and askd her how she got her clothes and janer said that hopefully everyone will have more clothes by the fall!!!!" (F5 telegram June 12) 3. "_____ sent me a telegram asking if we want 2 change into the same clothes do U?" (F8 telegram May 26)

Table 4.19

Posting Frequencies for Indicator I3: Referring

Indicator	M1	M2	M3	F4	F5	M6	M7	F8	M9	Total postings
Referring	0	0	0	15	19	0	1	25	0	6

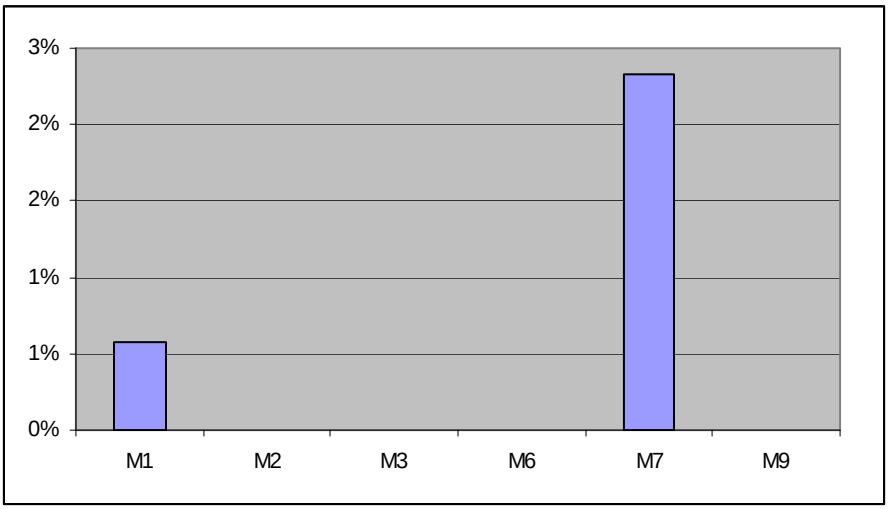

Figure 4.19. Male posting frequencies for referring.

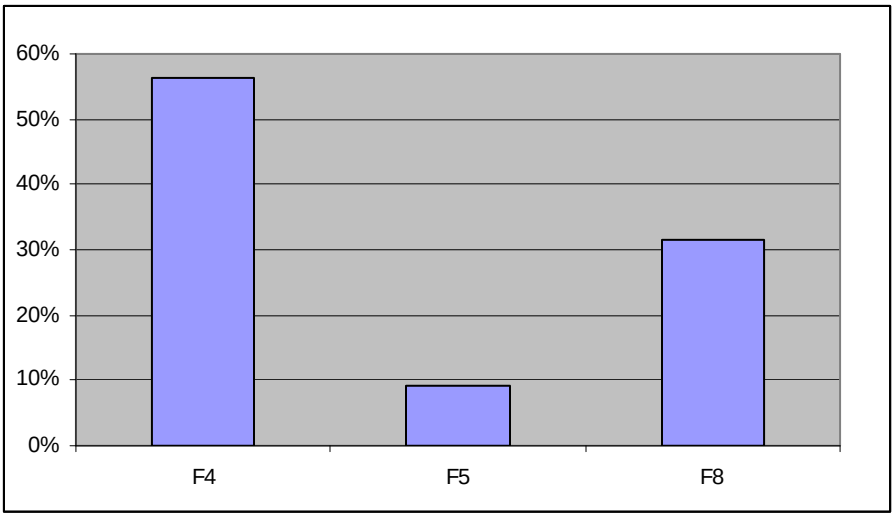

Figure 4.20. Female posting frequencies for quoting.

Indicator I4: Asking questions.

Table 4.20

Results for Indicator I4: Asking Questions

Instrument Definition	Operational Definition	Examples from Transcript
Students ask questions of other students or the moderator	Instrument definition; asking questions for getting to know others/small talk, gathering information, requesting assistance or clarification, requesting positive input, asking for location of person or visual item and offering something/generosity.	1. “do u like 2 read? do u like 2 sing? do u like 2 dance? do u like brenette or blond or black or red 4 a hair color? do u like 2 talk? do u like 2 run?“(F4 email May 29) 2. “Have you done every quest yet?” (M1 telegram May 22) 3. “hey wazzup?” (M1 telegram June 2) 4. “How do you finish the quests that are just floating around?” (M1 telegram May 22) 5. “do U like my outfit?’” (F5 chat June 25) 6. “do U want me to help!?” (F8 chat June 25) 7. “cool, do u want a col?” (M1 telegram June 16)

Table 4.21

Posting Frequencies for Indicator I4: Asking Questions

Indicator	**M1**	**M2**	**M3**	**F4**	**F5**	**M6**	**M7**	**F8**	**M9**	**Total postings**
Asking questions	36	4	2	594	106	5	18	218	5	988

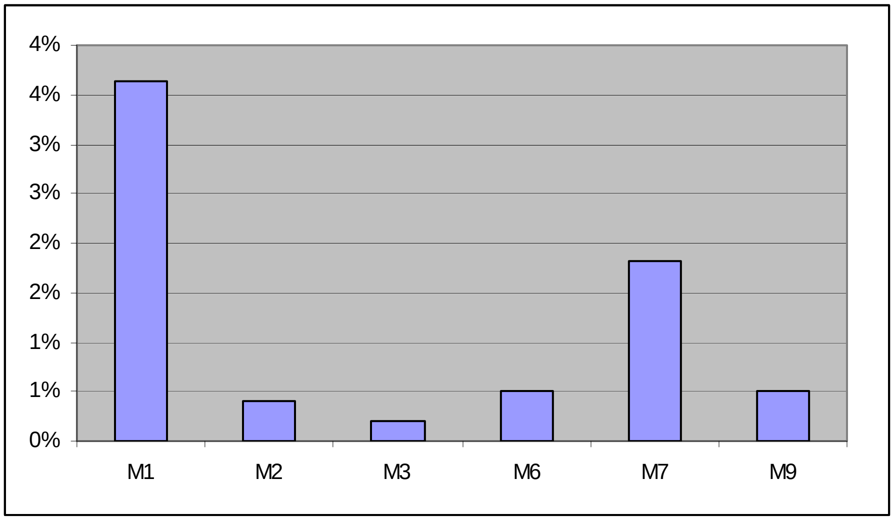

Figure 4.21. Male posting frequencies for asking questions.

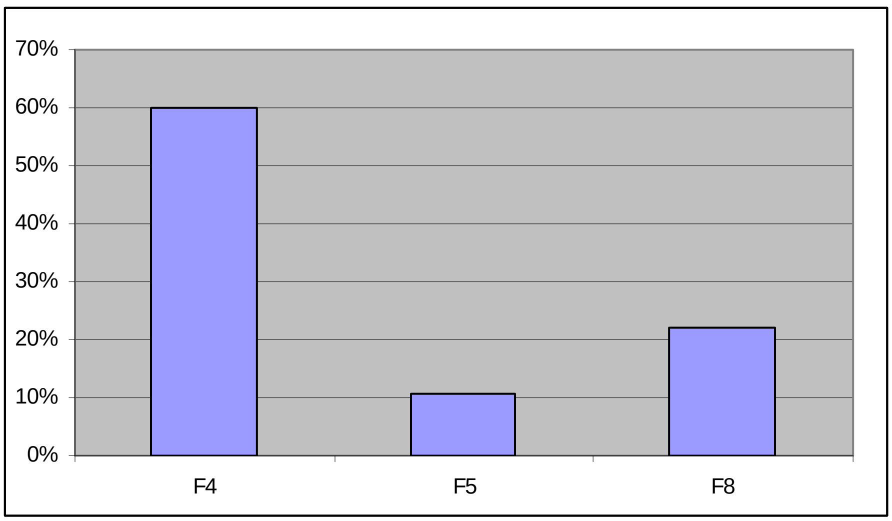

Figure 4.22. Female posting frequencies for asking questions.

Indicator I5: Complimenting, appreciation.

Table 4.22

Results for Indicator I5: Complimenting, Appreciation

Instrument Definition	Operational Definition	Examples from Transcript
Complimenting others or contents of others' messages	Instrument definition	1. "that's a cool idea" (M1 telegram June 25), 2. "Nice dancing!!" (F8 telegram May 22)

Table 4.23

Posting Frequencies for Indicator I5: Complimenting, Appreciation

Indicator	M1	M2	M3	F4	F5	M6	M7	F8	M9	Total postings
Complimenting, appreciation	7	1	0	215	54	0	3	77	1	358

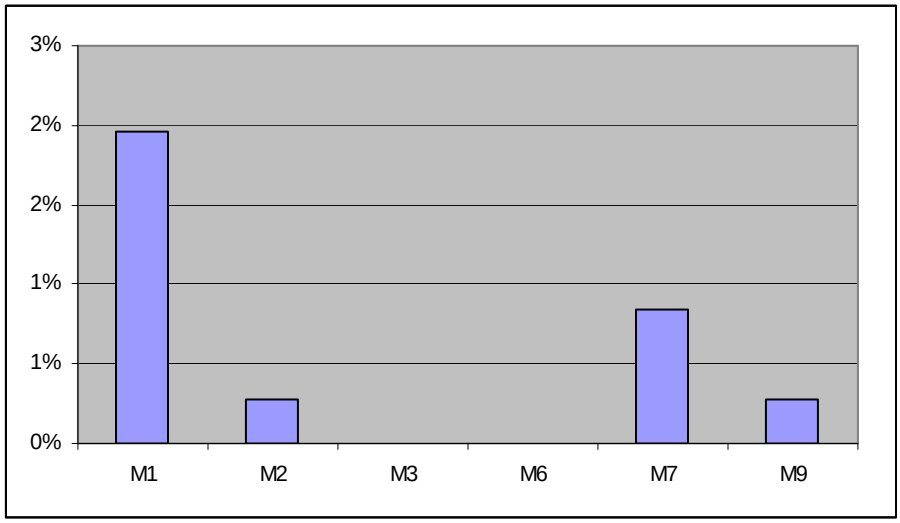

Figure 4.23. Male posting frequencies for complimenting, appreciation.

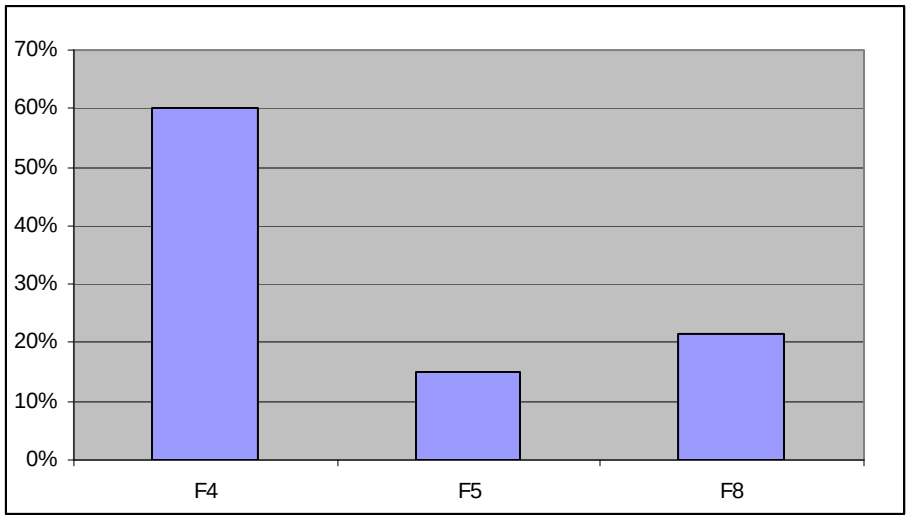

Figure 4.24. Female posting frequencies for complimenting, appreciation.

Indicator I6: Expressing agreement.

Table 4.24

Results for Indicator I6: Expressing Agreement

Instrument Definition	Operational Definition	Examples from Transcript
Expressing agreement with others or content of others' messages	Instrument definition	1. "i TOTALLY AGREE LOLOLOLOL" (F4 chat June 4) 2. "yees! i should b the QUEEN OF E-MAILS!!!!!" (F4 email June 4) 3. "Ya they R sometimes hard 2 understand!" (F5 email June 9)

Table 4.25

Posting Frequencies for Indicator I6: Expressing Agreement

Indicator	M1	M2	M3	F4	F5	M6	M7	F8	M9	Total postings
Expressing agreement	7	3	1	204	54	0	10	43	0	322

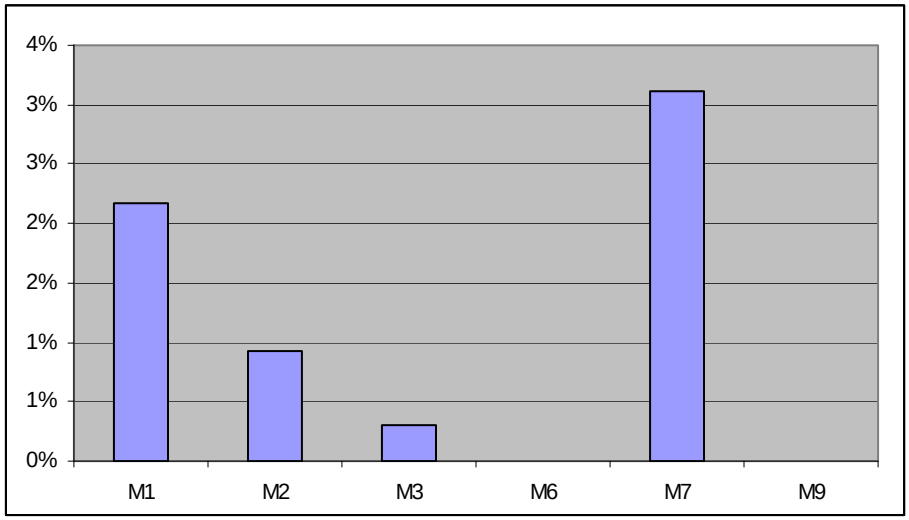

Figure 4.25. Male posting frequencies for expressing agreement.

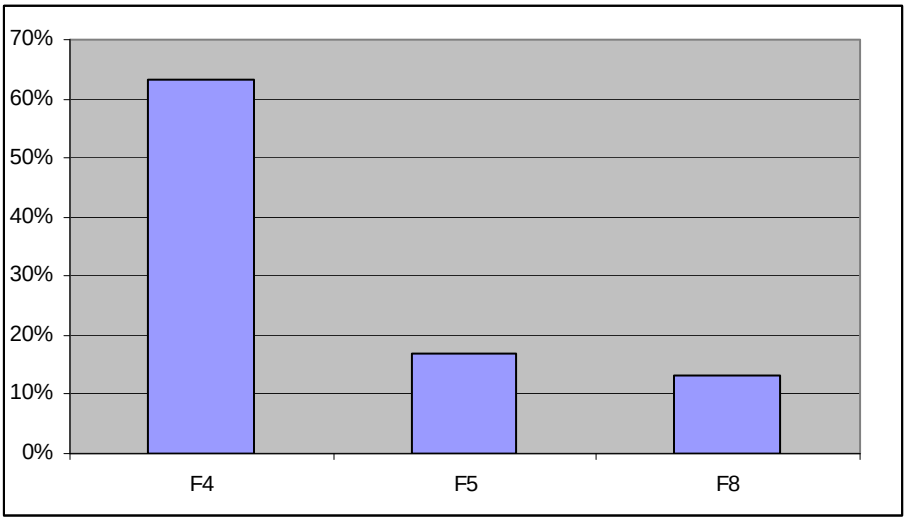

Figure 4.26. Female posting frequencies for expressing agreement.

*Note that there was more input than usual from the male students here.

Indicator I7: Starting a thread.

Table 4.26

Results for Indicator I7: Starting a Thread

Instrument Definition	Operational Definition	Examples from Transcript
New Indicator	Using QA chat, telegram or email tools to start a thread; statements, trying to elicit help/sharing a problem, looking for positive feedback, exhortations, play-by-play (kind of like Facebook), initiating friendship and self-disclosure.	1. “I wonder how many lumins you get when you're done!” (M1 telegram May 23) 2. “I hope we dont have 2 work on are quests” (F8 telegram May 26) 3. “I can never seem 2 think of something interesting!!!!!!!!” (F5 email June 5) 4. “i thought u sayed that u would e-mail back if i sent u more!” (F4 email May 29) 5. “I am trying 2 make a really long e-mail just like U did. Bbbbbuuuuuttttttt I don't know what 2 type. I get bored of my clothes soooo fast thats why I have probably changed my clothes 3 times since I put on the purple clothes.” (F8 email May 21 6. “guess wut Camp Rock is on the disney channel rite now but i'm not watchin it rite now:(but on ma tv u can record showz on tv that u don't want 2 miss or just want 2 record! which meanz that u can watch the showz u recorded over nd over on ur tv!!! so i'm recordin Camp Rock!!!! so i'm

		gonna watch it sumtime!!!!!!!!!!!!!!!!!!” (F4 email June 20)

Table 4.27

Posting Frequencies for Indicator I7: Starting a Thread

Indicator	M1	M2	M3	F4	F5	M6	M7	F8	M9	Total postings
Starting a thread	1	0	0	101	17	0	4	54	0	177

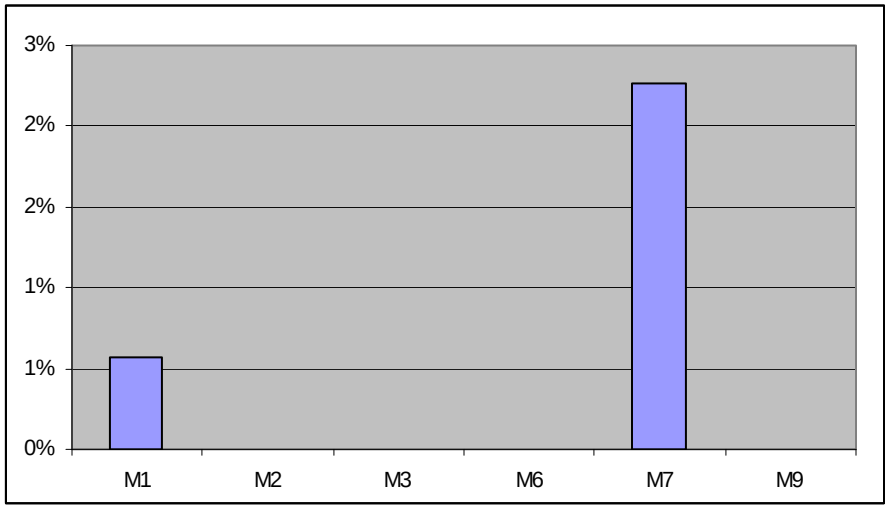

Figure 4.27. Male posting frequencies for starting a thread.

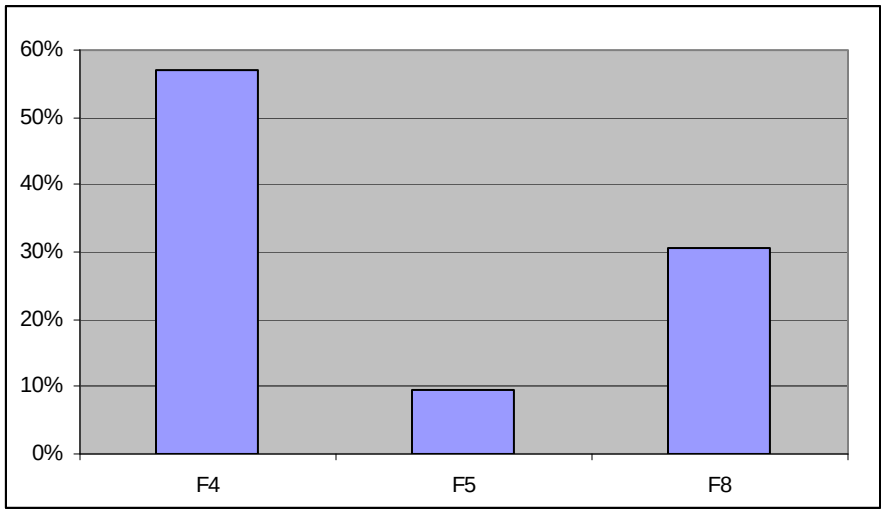

Figure 4.28. Female posting frequencies for starting a thread.

Indicator I8: Visual acknowledgement.

Table 4.28

Results for Indicator I8: Visual Acknowledgement

Instrument Definition	Operational Definition	Examples from Transcript
New Indicator	Using text that indicates visual acknowledgment or recognition of others in the environment.	1. “hat was so wierd 4 people jumped at the exact same time!”” (F4 chat June 16) 2. “ur walkin weird!” (F4 chat June 2) 3. “k NOW i c u! i like ur clothes!” (F4 telegram May 26)

Table 4.29

Posting Frequencies for Indicator I8: Visual Acknowledgement

Indicator	**M1**	**M2**	**M3**	**F4**	**F5**	**M6**	**M7**	**F8**	**M9**	**Total postings**
Visual acknowledgement	0	0	0	71	11	0	2	17	0	101

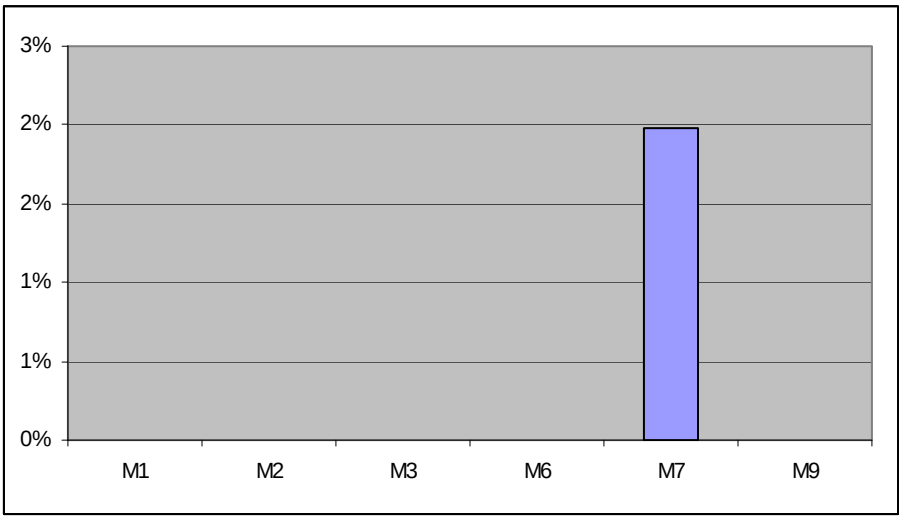

Figure 4.29. Male posting frequencies for visual acknowledgement.

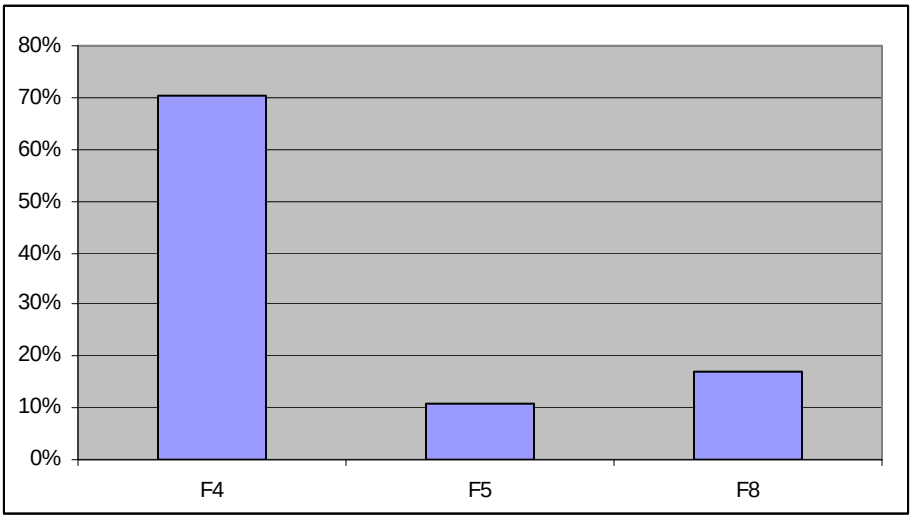

Figure 4.30. Female posting frequencies for visual acknowledgement.

*Note that the male students were particularly low in frequency for this indicator.

Indicator I9: Visual interaction.

Table 4.30

Results for Indicator I9: Visual Interaction

Instrument Definition	Operational Definition	Examples from Transcript
New Indicator	Telling others where things are, seeing the same things and doing things together like they would in the real world	1. “its also by the dressers and the fireplaces’” (F5 chat June 22) 2. “Go over the bridge then into the teleport tunnel. then go back into the t. tunnel and click on lot3. ’” (F5 telegram June 25) 3. “see?” (M1 telegram June 2) 4. “There is a secret teleport here it's the one that says story inn” (M7 chat May 22) 5. “I will race you to the – top - follow me - oops wrong way” (M3 chat June 2) 6. “ok i guess u can hug me of u want’” (F4 chat June 20)

Table 4.31

Posting Frequencies for Indicator I9: Visual Interaction

Indicator	M1	M2	M3	F4	F5	M6	M7	F8	M9	Total postings
Visual interaction	12	6	13	234	116	1	10	116	8	516

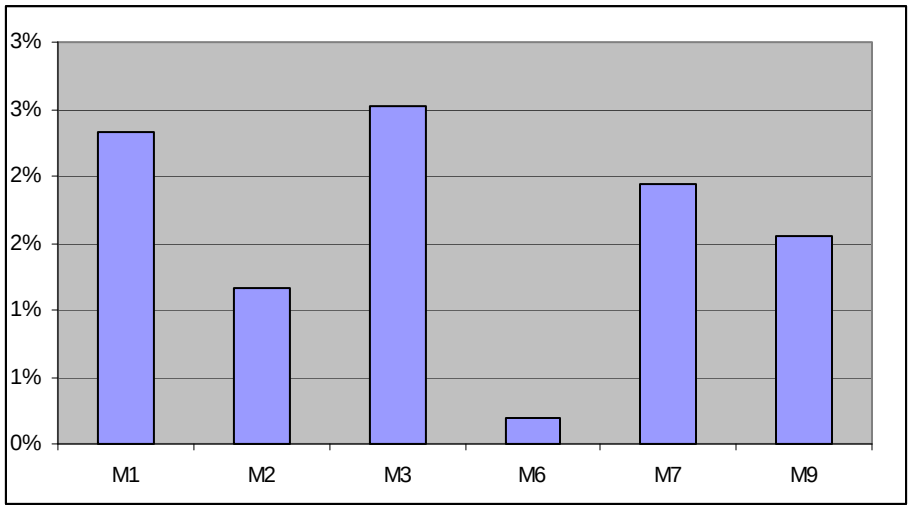

Figure 4.31. Male posting frequencies for visual interaction.

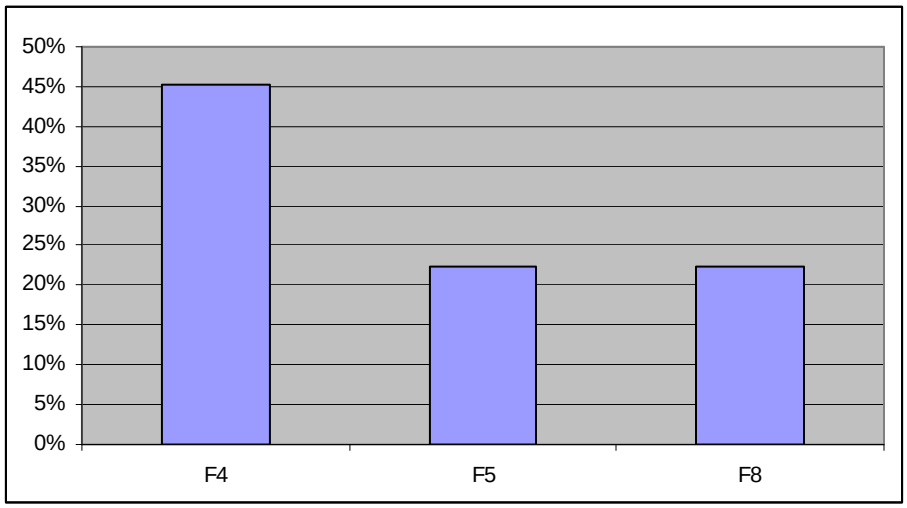

Figure 4.32. Female posting frequencies for visual interaction.

*Note that the male students manifested this type of communication with comparatively high frequency.

Indicator I10: Visual self-awareness.

Table 4.32

Results for Indicator I10: Visual Self-awareness

Instrument Definition	Operational Definition	Examples from Transcript
New Indicator	Evidence of an awareness of the avatar as an extension or representation of the participant	1. “and i was stuck in the flowers lol!’” (M1 chat June 25) 2. “2 bad i'm walkin wierd my legs won't move!!“ (F4 chat May 29) 3. “k i'm gona try this on tell me if u like it” (F4 telegram May 26) 4. “i'm inside the peramid.! its REALLY creepy!!!!!!” (F5 telegram May 22) 5. “I am doing the Egyption dance in Egypt world!!!!!!!” (S8 telegram May 23)

Table 4.33

Posting Frequencies for Indicator I10: Visual Self-awareness

Indicator	**M1**	**M2**	**M3**	**F4**	**F5**	**M6**	**M7**	**F8**	**M9**	**Total postings**
Visual self-awareness	2	0	0	18	7	0	4	9	0	40

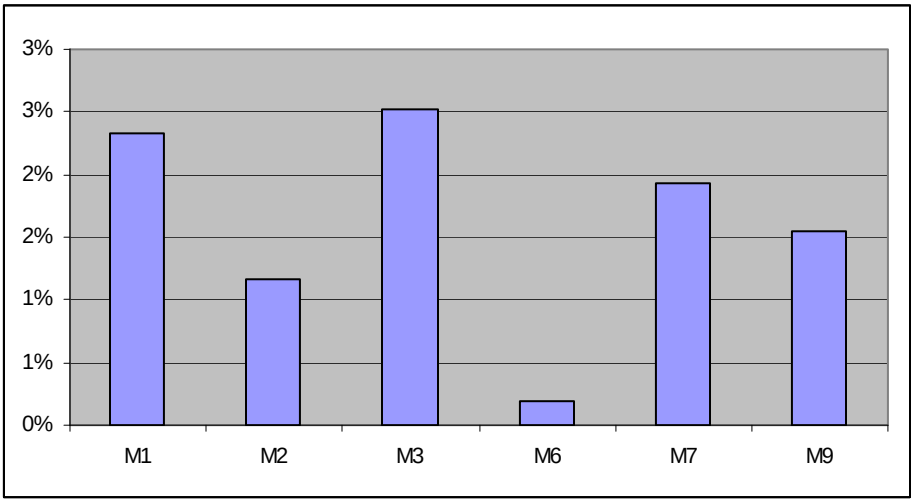

Figure 4.33. Male posting frequencies for visual self-awareness.

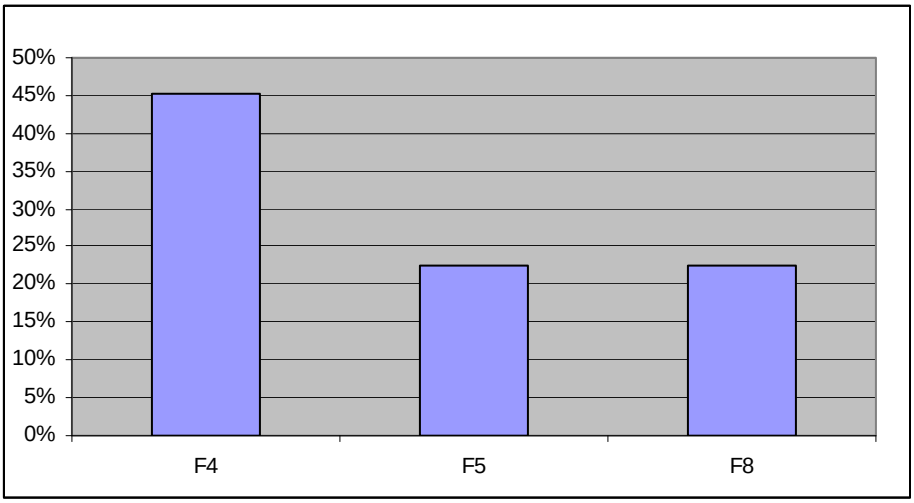

Figure 4.34. Female posting frequencies for visual self-awareness.

*Note a higher degree of participation from male students.

Indicator I11: Making a statement.

Table 4.34

Results for Indicator I11: Making a Statement

Instrument Definition	Operational Definition	Examples from Transcript
New Indicator	Statements that are made to no one in particular, are not responding to another post nor obviously starting a thread	1. “ive been on for like 20 mins and it still has 400 items 2 load!” (M1 chat June 25) 2. “this is an email” (M2 email June 9) 3. “there is 0 people in OTAK hub!!!!!!” (F4 email June 13) 4. “i just don't know what 2 talk about!" (F5 email June 2)

Table 4.35

Posting Frequencies for Indicator I11: Making a Statement

Indicator	**M1**	**M2**	**M3**	**F4**	**F5**	**M6**	**M7**	**F8**	**M9**	**Total postings**
Making a Statement	4	1	3	72	17	0	8	46	2	153

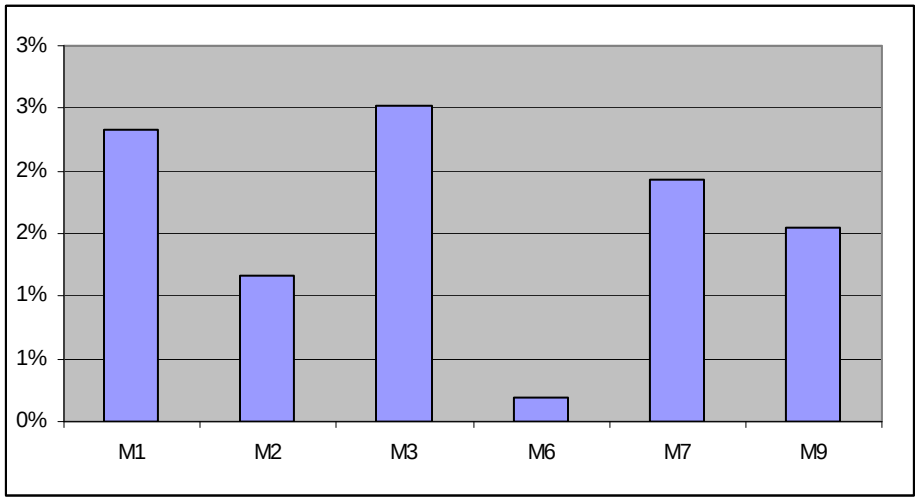

Figure 4.35. Male posting frequencies for making a statement.

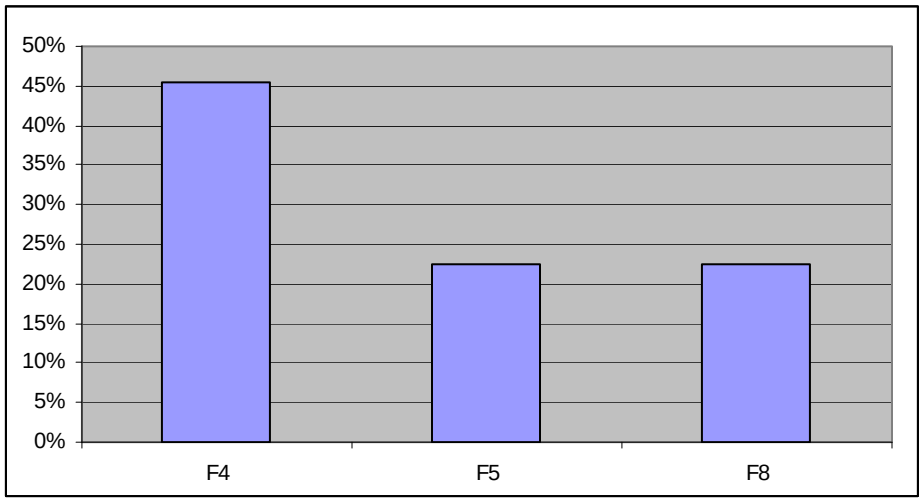

Figure 4.36. Female posting frequencies for making a statement.

Analysis of the Cohesive Category

Results for the *cohesive* category are displayed in this section and address the research question "Do students initiate group cohesiveness and if so how?" *Cohesive* messages accounted for 24% of the message content, running quite close to *affective* at 28%. Table 4.36 provides a breakdown of student post frequencies according to *cohesive* indicators.

Table 4.36

Comparison of Student Cohesive Posting Frequency

Indicator	**M1**	**M2**	**M3**	**F4**	**F5**	**M6**	**M7**	**F8**	**M9**	**Total Postings**
Vocatives	4	0	1	85	38	10	4	48	8	198
Inclusive	2	1	6	159	18	0	5	33	0	224
Phatics, Salutations	30	7	1	701	174	17	32	240	7	1209
Directional	6	0	0	107	38	0	3	27	0	181
Total Individual Cohesive Postings	42	8	8	1052	268	27	44	348	15	1812

*Note that all students had some postings in this category.

Indicator C1: Vocatives.

Table 4.37

Results for Indicator C1: Vocatives

Instrument Definition	Operational Definition	Examples from Transcript
Addressing or referring to participants by name	Instrument definition	1. “How long have you been on QA nikki” (M1 chat June 16) 2. “Hi Ed r u playing hide and go seek later” (M6 telegram June 2) 3. “hi sarahanettah told me that u would like 2 meet me(i think)” (F4 telegram June 16)

Table 4.38

Posting Frequencies for Indicator C1: Vocatives

Indicator	**M1**	**M2**	**M3**	**F4**	**F5**	**M6**	**M7**	**F8**	**M9**	**Total Postings**
Vocatives	4	0	1	85	38	10	4	48	8	198

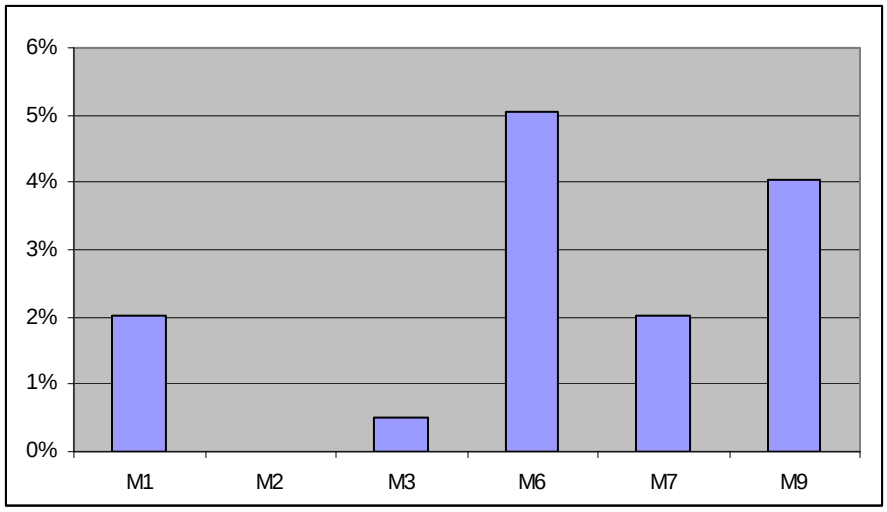

Figure 4.37. Male posting frequencies for vocatives.

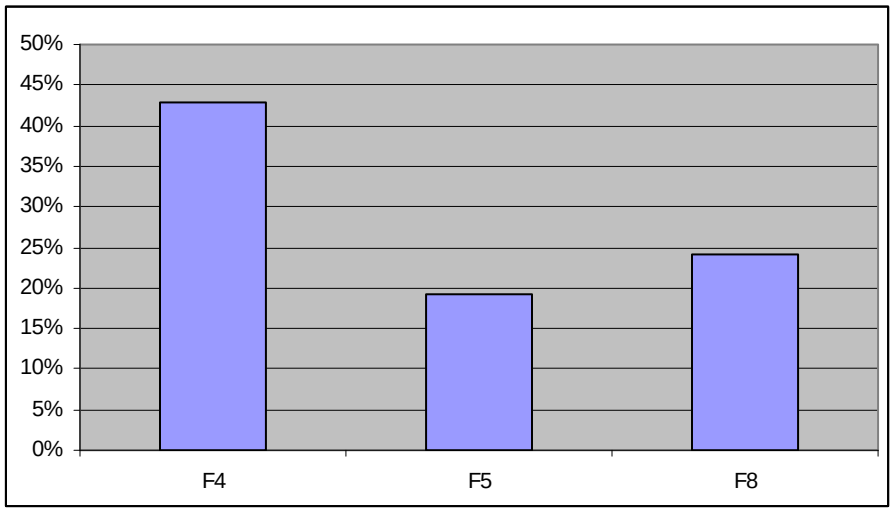

Figure 4.38. Female posting frequencies for vocatives.

Indicator C2: Inclusive.

Table 4.39

Results for Indicator C2: Inclusive

Instrument Definition	Operational Definition	Examples from Transcript
Addresses the group as *we, our, us, group*	Instrument definition including situations when students are including others, "giving" items to each other, offering friendship or making someone feel good.	1. "lets teleport home" (M3 chat June 2) 2. "ok I will come and U can follow me!'" (F8 telegram June 25) 3. "i'll give u a fragment of limestone'" (F4 chat June 16) 4. "I am enviting U 2 come 2 it on June 25,2008 monday @ 3:00pm! U don't have 2 come but I am enviting U! I am enviting everyone in our school...so U can talk 2 any one of Ur freinds!" (F8 email June 23) 5. "of course i like u!!!!!!!!!!!!!" (F4 telegram June 16)

Table 4.40

Posting Frequencies for Indicator C2: Inclusive

Indicator	M1	M2	M3	F4	F5	M6	M7	F8	M9	Total postings
Inclusive	2	1	6	159	18	0	5	33	0	224

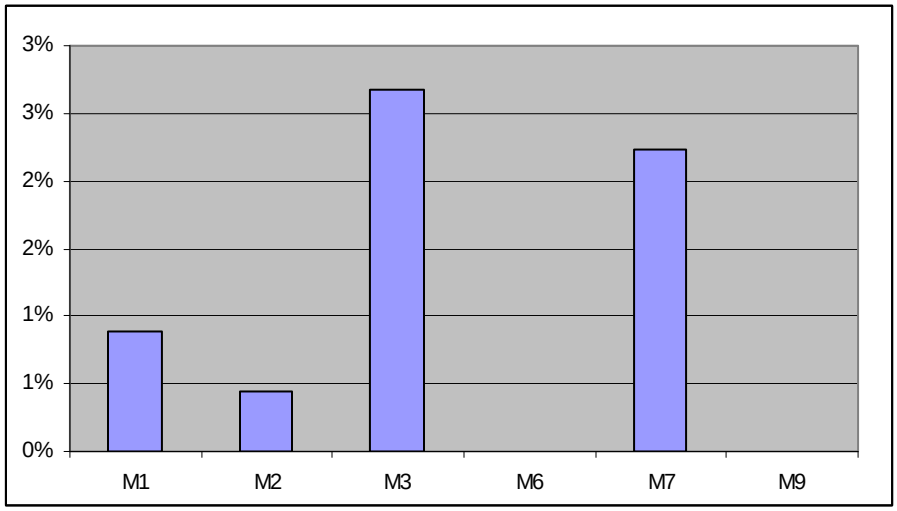

Figure 4.39. Male posting frequencies for inclusive.

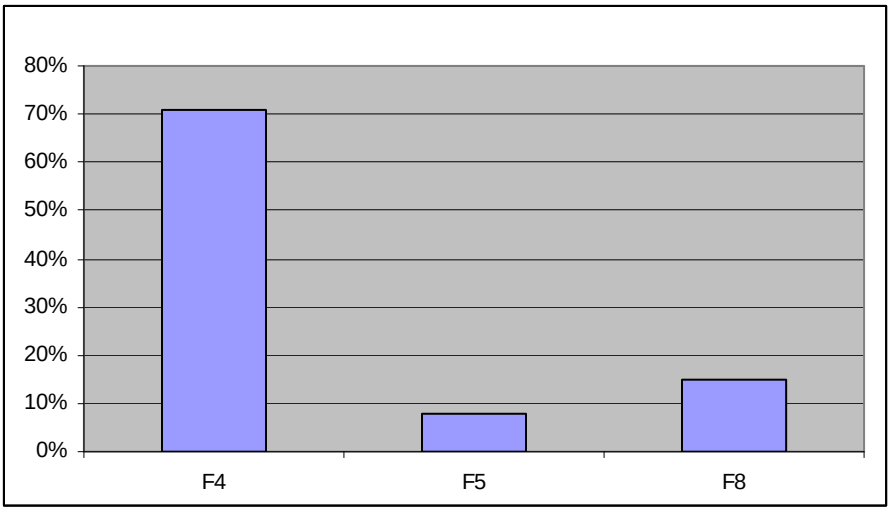

Figure 4.40. Female posting frequencies for inclusive.

Indicator C3: Phatics, salutations.

Table 4.41

Results for Indicator C3: Phatics, Salutations

Instrument Definition	Operational Definition	Examples from Transcript
Communication that serves a purely social function; greetings, closures	Addressing questions and issues from others, whether directly asked to or not by assisting and providing relevant guidance for them. This includes helping others to obey the I-BURST rules, reprimanding, and giving directives.	1. “hello” (M1 chat June 23) 2. Cya peoples” (M1 chat June 2) 3.‟‟heya” (F4 chat June 16) 4. “seeya” (M7 email June 24)

Table 4.42

Posting Frequencies for Indicator C3: Phatics, Salutations

Indicator	**M1**	**M2**	**M3**	**F4**	**F5**	**M6**	**M7**	**F8**	**M9**	**Total postings**
Phatics, Salutations	30	7	1	701	174	17	32	240	7	1209

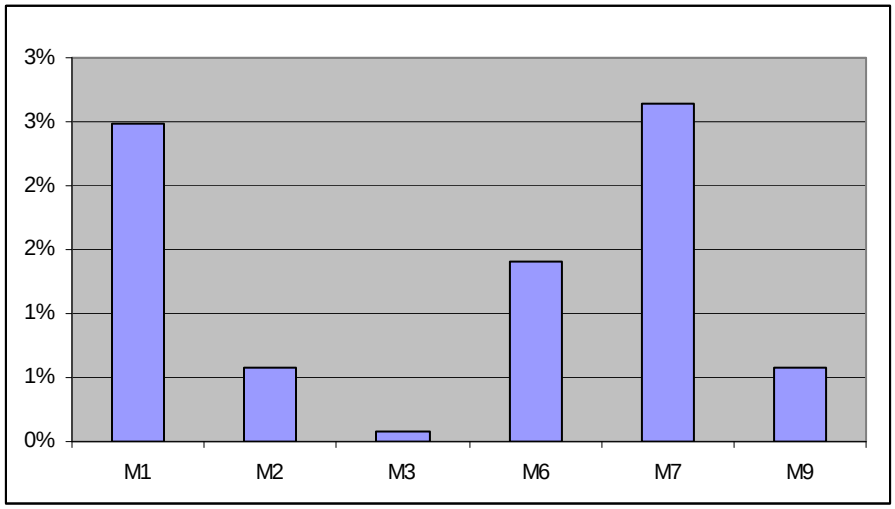

Figure 4.41. Male posting frequencies for phatics, salutations.

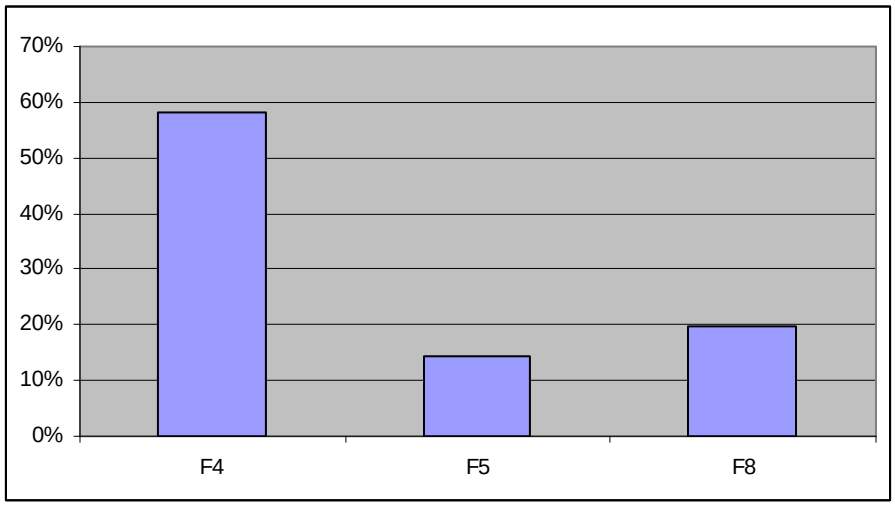

Figure 4.42. Female posting frequencies for phatics, salutations.

Indicator C4: Directional.

Table 4.43

Results for Indicator C4: Directional

Instrument Definition	Operational Definition	Examples from Transcript
New Indicator	Addressing questions and issues from others, whether directly asked to or not by assisting and providing relevant guidance for them. This includes helping others to obey the I-BURST rules, reprimanding, and giving directives.	1. “now let's not get 2 2 deep into a conversation cuz we don't want 2 break the I-BURST rules!” (F4 chat June 4) 2. “thats not very nice” (F4 chat May 16) 3. “Don't run” (F8 telegram May 15)

Table 4.44

Posting Frequencies for Indicator C4: Directional

Indicator	**M1**	**M2**	**M3**	**F4**	**F5**	**M6**	**M7**	**F8**	**M9**	**Total postings**
Directional	6	0	0	107	38	0	3	27	0	181

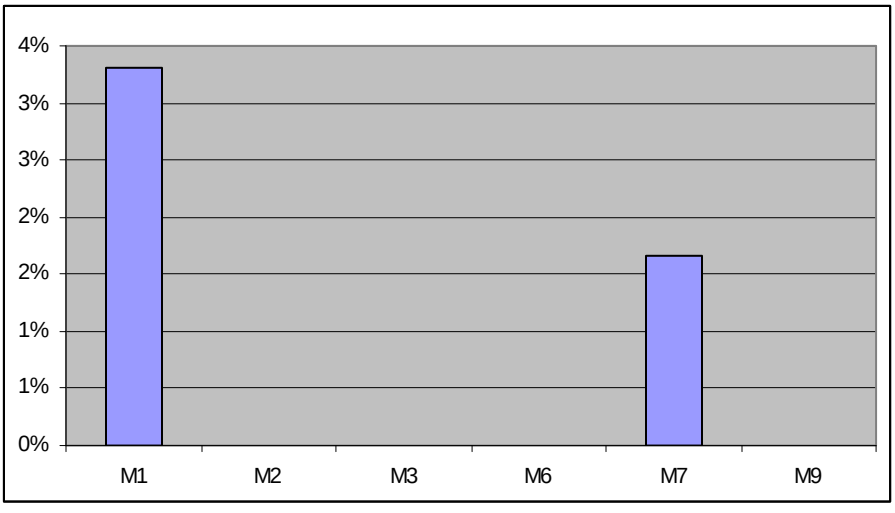

Figure 4.43. Male posting frequencies for directional.

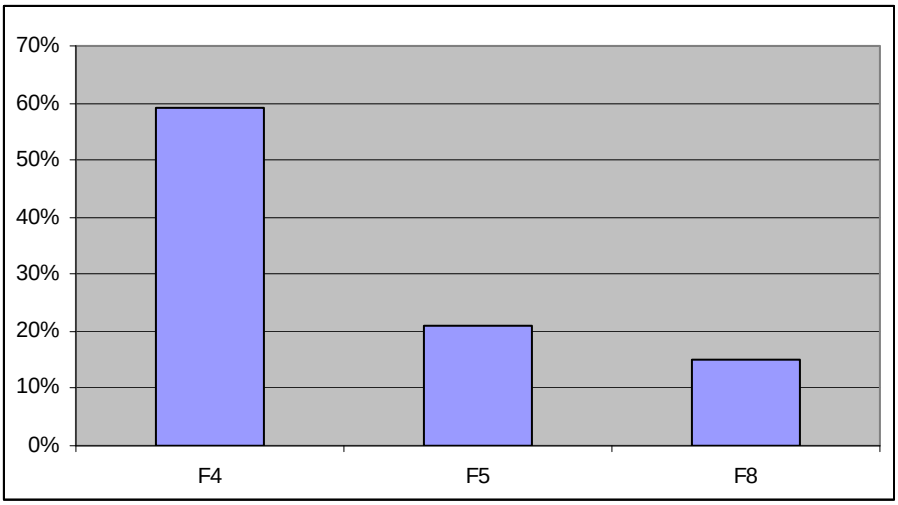

Figure 4.44. Female posting frequencies for directional.

Results for Student use of Communication Tools

Results of communication tool usage in Quest Atlantis are presented in this section and address the research question "Do the relational tools in QA promote and support manifestations of social presence and if so how?" The communication tools in QA are: chat, telegram, email, bulletin boards and weblogs. The chat and telegram tools were used frequently. There were fewer postings using the email tool but the posts themselves on email were longer than those using either of the other tools. There were a few bulletin board posts and the weblogs were not used. Compiled data is displayed in this section and male and female data is displayed separately. For individual student results see Appendix E.

Posting frequencies.

The date was analyzed to determine how frequently the students used each tool by examining the number of messages posted in each. Combined student data as well as separate male and female data were examined. Figure 4.45 shows combined student data.

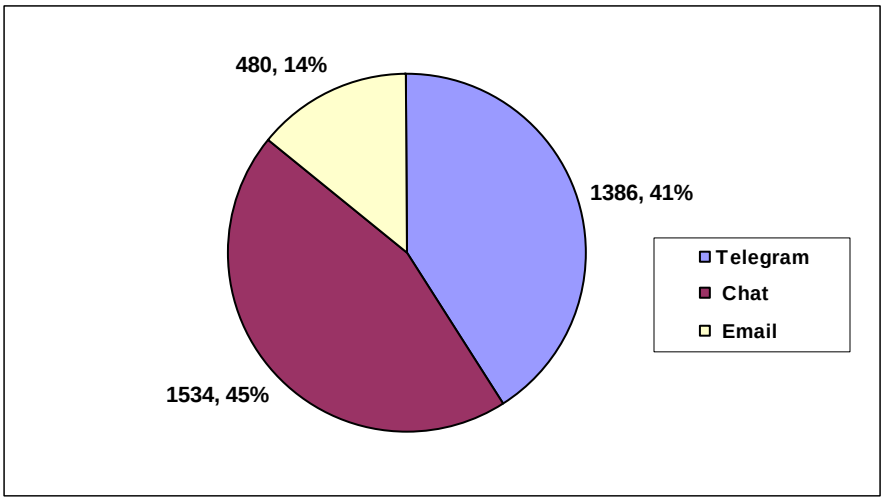

Figure 4.45. Overall student communication method comparison**.**

Figure 4.46 shows a breakdown of how frequently individual students used the tools. Three students used telegram more than 50% of the time, one used it approximately half of the time and five used it less than 50% of the time. Four students used chat approximately half of the time and five students used it less than 50% of the time. Three students did not use email at all, one used it close to 40% of the time and the other five used it less than 40% of the time.

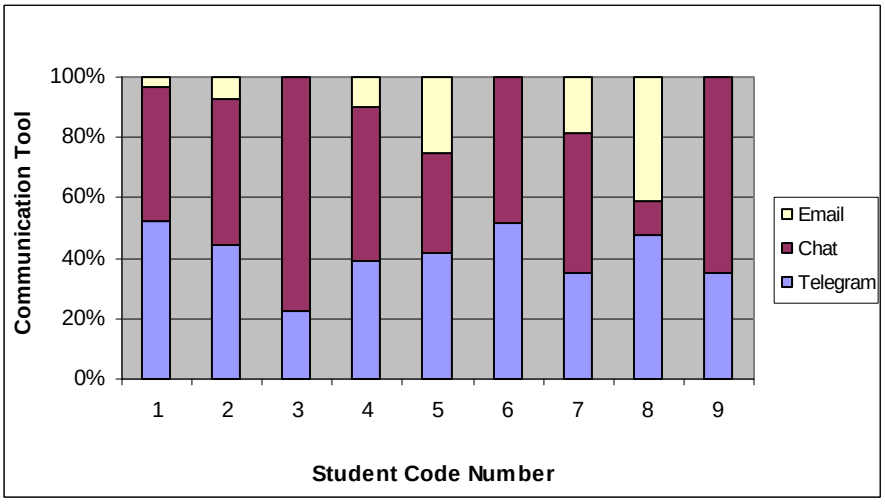

Figure 4.46. Individual student communication method comparison.

Two of the male students used telegram most often and four used chat most frequently (See Fig 4.47).

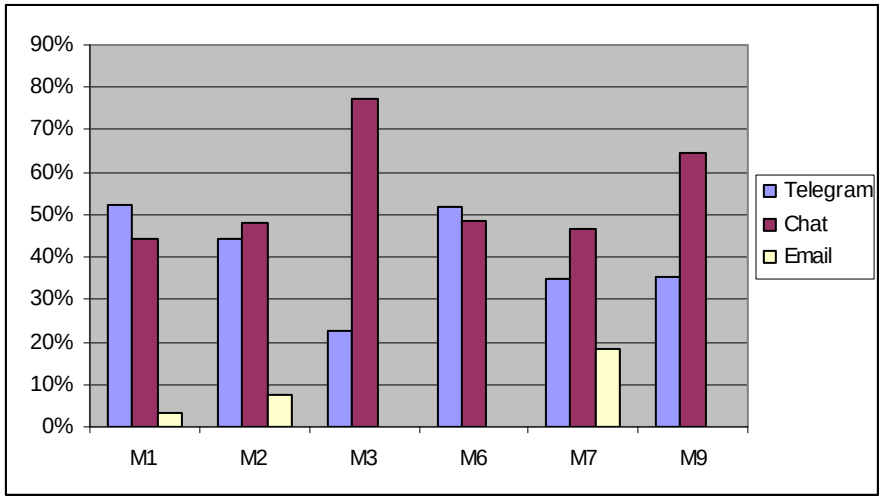

Figure 4.47. Male communication method comparison.

One of the female students used chat most often while the other two used telegram most often (See Fig 4.48).

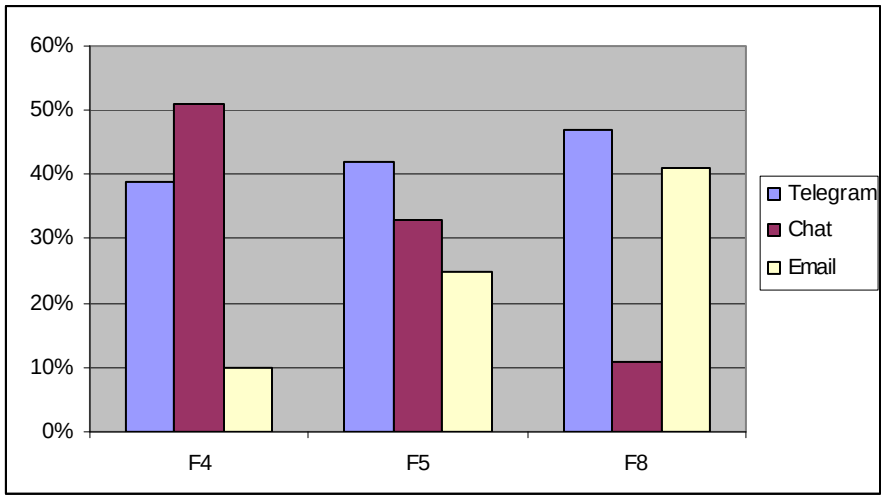

Figure 4.48. Female communication method comparison.

Posting length.

The data was examined to determine how long the messages were in each tool by examining number of words in each message. All students are compared to each other in Figure 4.49. Data for each tool is displayed separately and males are compared to females in Figures 4.50, 4.51 and 4.52.

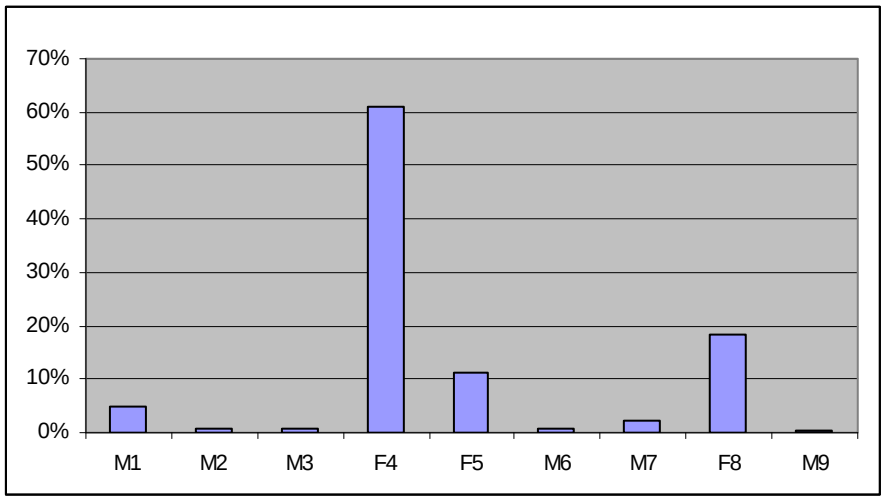

Figure 4.49. Posting length comparison.

For all students together, the average number of words per telegram was four. The average when combining the female data was six and four when combining the male data.

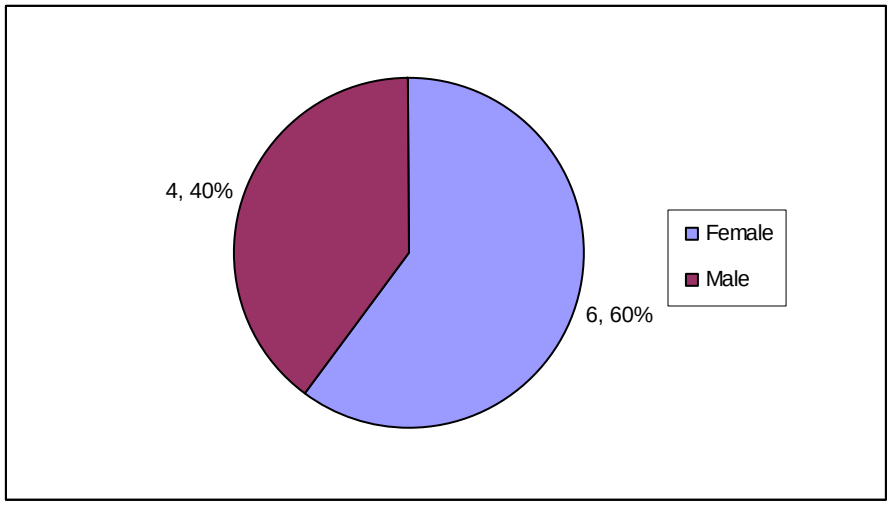

Figure 4.50. Telegram: average post length comparison: male vs. female.

For all students together, the average number of words per chat posting was three. The average when combining the female data was three and three as well when combining the male data.

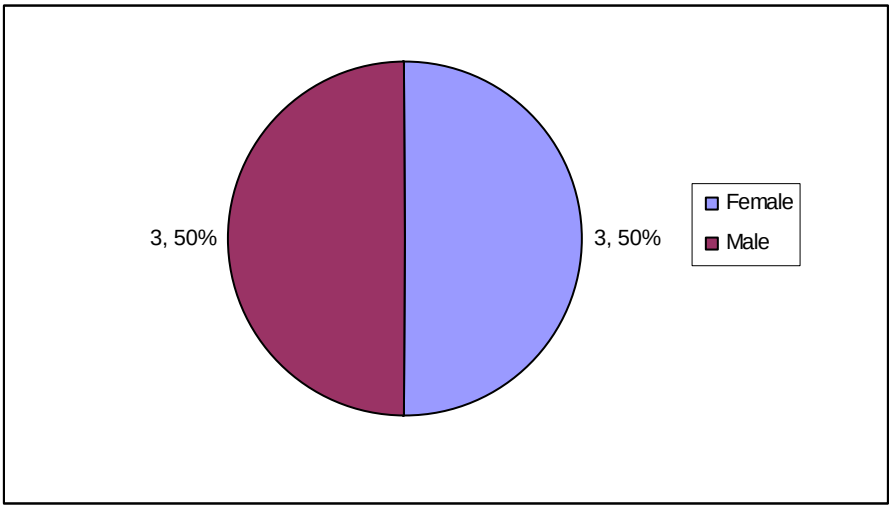

Figure 4.51. Chat: average post length comparison male vs. female.

When combining the postings of all the students, the average number of words per email posting was thirteen. The average when combining the female data was twenty-eight and six when combining the male data.

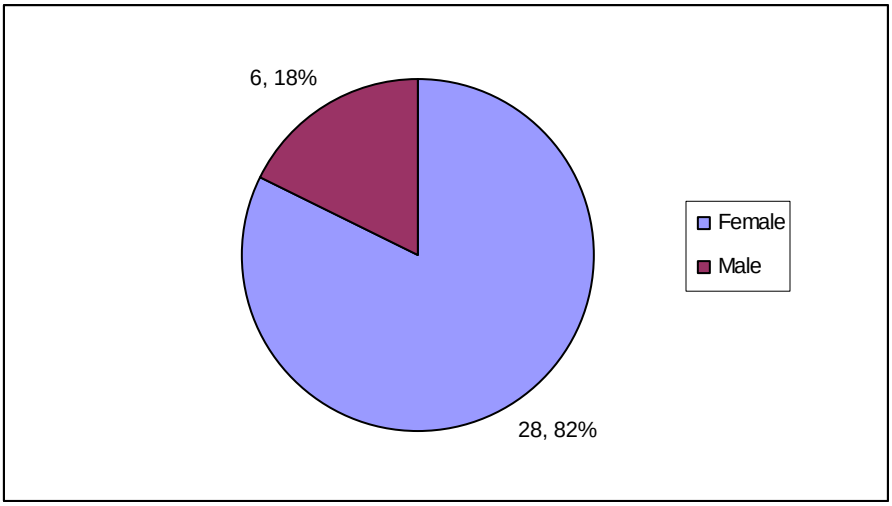

Figure 4.52. Email: average post length comparison male vs. female.

Tool preference.

Figure 4.53 shows communication tool preference with combined student data. When measuring frequency, students preferred the IM tools telegram and chat. However, if measured in terms of content volume, some students preferred the email tool. By frequency and by message volume, the order of tool preference from highest to lowest for the male students as a group were; telegram, chat and email. Four male students preferred using telegram and two preferred the chat tool. Only three used the email tool and the content volume for M1 and M2 was approximately three times as large as either telegram or chat. The content volume for M7 was higher than telegram or chat as well.

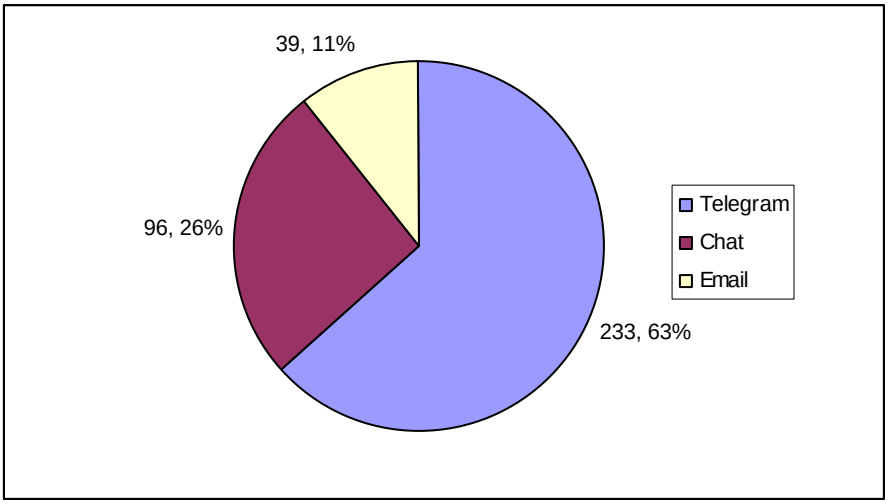

*Figure 4.5*3 Communication tool preference: male.

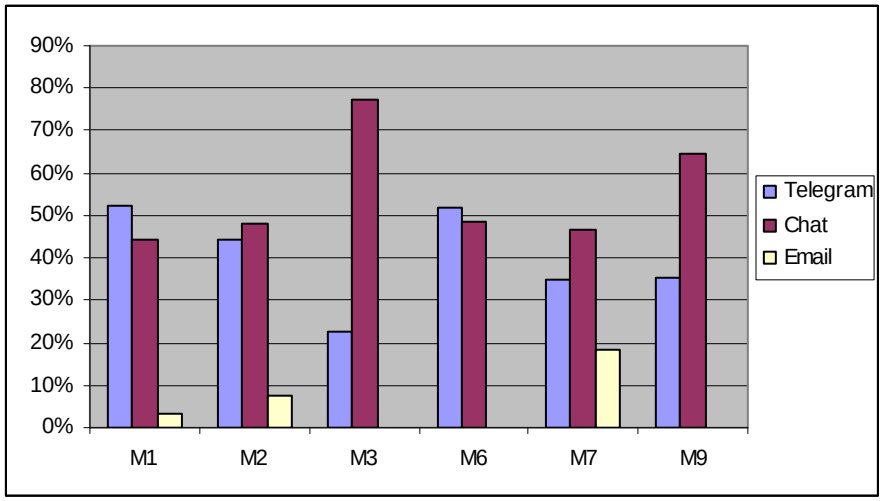

Figure 4.54. Male communication method comparison.

By frequency, the order of tool preference from highest to lowest for the female students as a group were; chat, telegram and email. By message volume, the order changes to email, telegram and chat. Two female students preferred using telegram and one preferred the chat tool. All three used the email tool and the content volume was at least six times as large as for either telegram or chat.

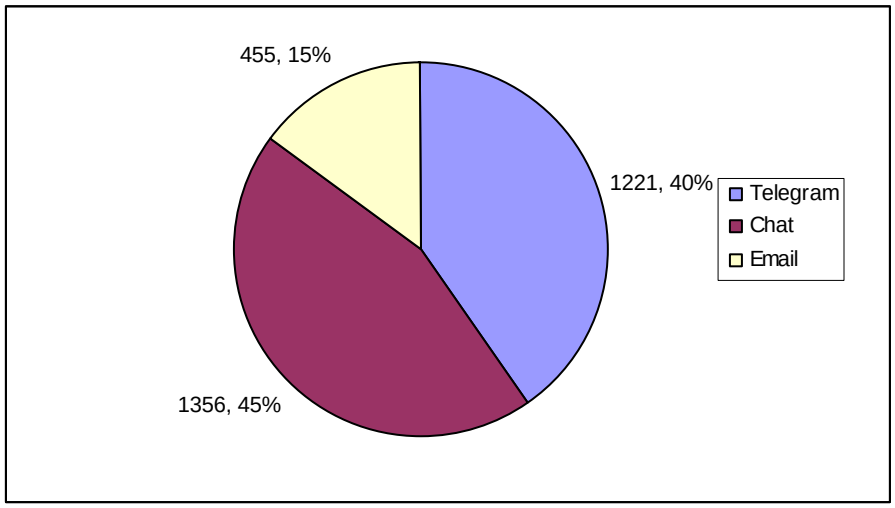

Figure 4.55. Communication tool preference: female.

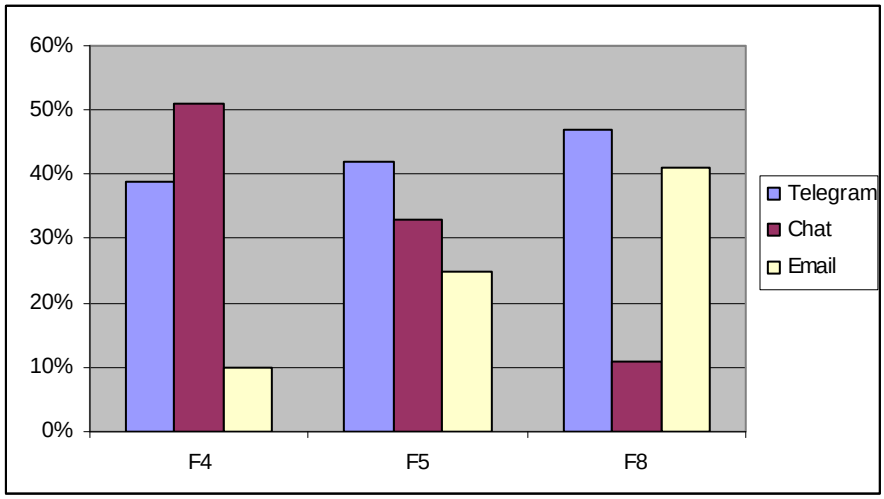

Figure 4.56. Communication tool preference: female.

Chapter Five: Discussion

We already knew that kids learned computer technology more easily than adults.... It is as if children were waiting all these centuries for someone to invent their native language. ~Jaron Lanier (in All the Best Quotes)

Although *Quest Atlantis*™ is an educational environment, this study looked solely at social presence. Garrison, et al. 2000 stated:

> The primary importance of [social presence] is its function as a support for cognitive presence….However, when there are affective goals for the educational process, as well as purely cognitive ones…then social presence is a direct contributor to the success of the educational experience. (p.3)

Perhaps learning environments such as this could help to create a place where students feel comfortable socially, which could in turn affect how well they learn. In this section I will discuss the results of my study and provide relevant insights. Comments on the outcomes for each of the indicators in the *affective, interactive* and *cohesive* categories, as well as for communication tool usage, are included in this chapter. As a precursor to my discussion of outcomes according to indicators, Table 5.1 displays the rank order of frequency of all indicators from highest to lowest.

Table 5.1

Rank Order of Total Post Frequency for Each Indicator

Frequency Rank	Category	Indicator	Student Postings out of 7700	% of Total Message Content
1	Affective	Expression of Emotion	1395	18
2	Cohesive	Phatics, salutations	1209	16
3	Interactive	Continuting a thread/replying	1004	13
4	Interactive	Asking questions	988	13
5	Interactive	Visual interaction	516	7
6	Interactive	Complimenting, appreciation	358	5
7	Interactive	Expressing agreement	322	4
8	Affective	Use of humour	287	4
9	Affective	Creative expression	253	3

10	Cohesive	Inclusive	224	3
11	Cohesive	Vocatives	198	3
12	Cohesive	Directional	181	2
13	Interactive	Starting a thread	177	2
14	Affective	Self-disclosure (outside QA)	174	2
15	Interactive	Making a Statement	153	2
16	Interactive	Visual acknowledgement	101	1
17	Interactive	Referring	54	1
17	Affective	Self-disclosure (in-world)	60	> 1
18	Interactive	Visual self-awareness	40	> 1
19	Interactive	Quoting	6	> 1

The fact that there were manifestations of social presence in *all* the indicators in *all* three categories could indicate that the social climate was friendly and that the participants felt comfortable with the group as a whole (Rourke, Anderson. Garrison & Archer, 2000). All students indicated in the interviews that they liked and felt comfortable in *Quest Atlantis*™.

Discussion of Results

Affective Category

An analysis of results in the *affective* category will be presented in this section. *Affective* messages accounted for 28% of the total message content. This is similar in frequency to *cohesive* messages. One of the *affective* indicators, Expression of emotion, in comparison to all other indicators, accounted for 18% of the total message content and was first overall in frequency.

Indicator A1: Expression of emotions.

The operational definition for this indicator is:

Conventional expressions of emotion or unconventional expressions of emotion.

Includes repetitious punctuation, conspicuous capitalization, emoticons, emphasis on certain feelings, making others feel better or encouraging others, teasing others playfully, exhibiting excitement, attempting to elicit communication from others, or making emphatic statements.

This indicator ranked first in frequency across all three categories with a total of 1395 occurrences and was therefore the most frequently used form of communication. The female students accounted for 99% of the total posts in comparison with the male students who accounted for 1% of the total posts in this indicator. This could mean that females feel more comfortable expressing their emotions in this context, or, are generally more extroverted in this specific sample and/or context. Of the female students, F4 had more than twice the postings of the others. Of interest are frequencies for M3 and M9 who had no postings at all in this category. M2 had three postings and M6 had only one. In comparison with postings in other categories, the male students used this form of communication more frequently than others. When asked if they felt free to express how they felt about things in *Quest Atlantis*™, most students answered positively, two said "sometimes", one did not know and one said it was "like a computer game". It is interesting that although M2, M3 and M6 did not express themselves emotionally very much, they indicated in their answer to the interview question that they felt *free* to express themselves.

Indicator A2: Use of humour.

The operational definition for this indicator is "teasing, cajoling, irony, understatements, sarcasm, responses to funny statements, laughing at self, silly or nonsensical statements and making jokes or witty comments." This indicator ranked

eighth in frequency across all three categories with a total of 287 occurrences. This frequency is similar to Creative Expression in terms of number of postings. The female students posted in the following order of frequency from highest to lowest: F4, F8, and F5. Only two male students posted humorous quotations. In response to the interview question "Do you joke with others sometimes?" two answered yes, two sometimes and five no or not really. M1, F4, F5, M7 and F8 all had quotations that are characterized by this indicator. M7 was the only one that contradicted the data in that he answered no but did have quotations here. F5 said she joked with the people she knows.

I don't believe that any irony or understatements were used and I only found one possible example of sarcasm. This could be due to the young age of the students and the fact that their communication is less complex than teenagers or adults. I also included "LOL" (laugh out loud) quotations here. "LOL" and "laughing at oneself" were by far the most common quotations here. I included statements that had "LOL" either in the middle or at the end.

Indicator A3: Self-disclosure (in-world).

The operational definition for this indicator is "presents details of life inside QA or expresses vulnerability inside QA world." This indicator ranked 17th in frequency across all three categories with a total of 60 occurrences. This frequency is the same as "Referring" at third lowest. Perhaps there is not as much to disclose about themselves in-world as there is outside QA world where there were almost three times the amount of postings. I noticed that preference of QA communication tools is disclosed by participants in this indicator M1, F4, F5, M7 and F8 all had quotations characterized by this indicator.

Indicator A4: Self-disclosure (outside QA world).

The operational definition for this indicator is "presents details of life or expresses vulnerability outside of QA world." This indicator ranked 14th in frequency across all three categories with a total of 174 occurrences. Although comparatively low in frequency, the frequency of postings here is approximately three times as high as "in-world" self-disclosure, probably because the scope of what is happening in their lives is much broader in their real space worlds. M3, M6 and M9 did not have any postings here and M2 only had one. Since they are all male students, I would assume that this is not the social expression of choice for them. Interview data is consistent with descriptive data in that those students who said they talked about themselves had postings here and those who said they did not talk about themselves did not have postings here. M1 said he only talked about himself a little. M2 mentioned that he did not disclose much personal information. F5 gave some details about a conversation she had with another student and M7 said he only talked about himself when using the telegram tool. I asked those students who answered negatively why they did not talk about themselves much. Out of the five respondents, two were trying to obey the I-BURST rules and two said that no one had asked them about themselves. "I-BURST" stands for "I will...Be careful sharing Use good words, Respect others, Support all and Talk to someone new". Students are made aware of these rules upon entering QA and are expected to follow them diligently. Infringements are reported to the supervising teacher and can result in suspension from the world. In at least two cases, I-BURST rules hindered self-disclosure.

Indicator A5: Creative expression.

The operational definition for this indicator is “use of various keyboard tools and features in an unconventional way, including but not limited to patterns, designs, expressing ideas creatively, decorating words and unconventional uses of language such as “l8er.” This indicator ranked ninth in frequency across all three categories with a total of 253 occurrences. Of interest is that only 1 male student (M7) had 1 quotation that fit here. The female students F4, F5 and F8 had post frequencies of 161, 39 and 52. S4 posted more than twice the amount of F5 and F8. In this category, the gender difference is most pronounced. The female students seemed to really enjoy expressing themselves in new and creative ways. They all used keyboard functions to create patterns such as

“hER ARE SOME OF MY FACES----- <_> _/? +_+ ^_^ <_> *_* $_$!_! #_# @_@!!!!!!!!!!!!!!!!!!!!!!!!!! lIKE EM??????” (8email June 27) and designs for aesthetic purposes such as **“**"""""""""""""""""" **.....** <><><><><><><><><><><> ********** P.S. do u like the designs?” (F4 email June 2).

Quotations like “cul8er” could have been creative ways to shorten typing time, or perhaps the young age of the students was a limiting factor in their ability to type at length and spell correctly. This type of abbreviating could have become a social norm in this context and could also have been evidence of students transferring skills used in phone texting and/or other IM tools such as MSN.

Interactive Category

An analysis of results in the *interactive* category will be presented in this section. *Interactive* messages accounted for 48% of the total message content. One of the indicators, Continuing a Thread/Replying accounted for 13% of the total message content

and was the third most common type of communication in the study.

When asked if they were able to talk easily with others in QA, seven students answered positively, one said “kind of” and another said “fairly.” When asked to specify what made this easy, most answered that they enjoyed talking and meeting new people. One student thought that it was easy because he was not talking with people face-to-face and because most people were friendly. Another student said he “got used to it.” One student attributed ease of communication to the email, chat and telegram tools in QA.

Indicator I1: Continuing a thread/replying.

The operational definition for this indicator is “using chat, telegram or email tools to reply to a thread (comment, question, etc); general replies, self-disclosure, asking for clarification and providing clarification.” This indicator ranked third in frequency across all three categories with a total of 1004 occurrences. The increased frequency of this indicator could have been there was a broad range of quotations coded in this area. Replying is a basic component of communication and thus occurs frequently. There were a lot of “idk” “ok” “I think”, “oh”, “found u” and “icu” included here. Others were obviously answers to questions. Also, one can reply several times to the same thread. Each student was able to reply to any number of students in *Quest Atlantis*™, not just those in the study group. Also, students would break up their comment into several different postings, each counting as a reply. All students answered positively to the question “Do you reply when someone talks to you?” and all had quotations characterized by this indicator so interview data was consistent with descriptive data.

Indicator I2: Quoting from others' messages.

The operational definition for this indicator is "using software features to quote others' entire message or cutting and pasting selections of others' messages." This indicator ranked 19th or last in frequency across all three categories with a total of six occurrences, five of which were made by F4 and all of which were made by female students. The low evidence of this type of communication could be partially, if not entirely, due to the age of the students. This is a higher order application of communication that the students may not possess yet. As well the discussions here were not intellectual. They are more likely to communicate using "referring" techniques.

When asked the question "When you are talking to someone in *Quest Atlantis*™ do you mention what someone else in QA has said to you?" F4 answered "not really" in the interview, which is not consistent with her five quotations in the descriptive data. F5 answered yes although I found only one instance of this with her. All others answered negatively which is consistent with the data.

Indicator I3: Referring.

The operational definition for this indicator is "direct references to content of others' posts and quotations in which a student referred to another student who was not directly involved in the conversation." This indicator ranked 17th in frequency, with the same number of postings as self-disclosure (in-world), across all three categories with a total of 60 occurrences. This was among the lowest in frequency with only visual self-awareness and quoting coming in lower. Again, I think this is a higher order communication technique, and the students are quite young.

Indicator I4: Asking questions.

The operational definition for this indicator is “students ask questions of other students or the moderator, ask questions for getting to know others/small talk, gather information, request assistance or clarification, request positive input, ask for location of person or visual item and offer something/generosity.” This indicator ranked fourth in frequency, with a total of 988 occurrences. This was a frequently used method of communication, coming in behind expression of emotion, greeting, and replying to a thread. All students had quotations characterized by this indicator so the male students did manifest this type of communication as compared to other types. Female students remained consistently frequent in their postings. M3 had very few and this is evidenced in the interview data. In all other cases, interview data was consistent with descriptive data.

Indicator I5: Complimenting, appreciation.

The operational definition for this indicator is “complimenting others or contents of others’ messages.” This indicator ranked sixth in frequency, with a total of 358 occurrences. This was relatively high in frequency. I included the “cools” and “thanks” in this section. Students M1, F4, F5, M7, F8 and M9 all had quotations characterized by this indicator. When asked “Do you give compliments or thank others or encourage others?” five responded positively, two responded negatively and two said they did sometimes. One of the latter said he would rather explore by himself or with other students in his class. Interview and descriptive data were consistent.

Indicator I6: Expressing agreement.

The operational definition for this indicator is "expressing agreement with others or content of others' messages." This indicator ranked seventh in frequency across all three categories with a total of 322 occurrences. This is close in frequency to complimenting and expressing agreement. I included all the "yes," "ya," "sure" and "yep" quotations here as well as "I agree," "I know what you mean," "I know" and "me too." When asked in the interview "Do you tell others when you agree with what someone has said?" three answered positively and others either were not sure or answered negatively. Students M1, F4, F5, M7 and F8 all had quotations characterized by this indicator. M1 did not think he had and he had whereas M3 thought he had but hadn't. Otherwise interview data was consistent with descriptive data.

Indicator I7: Starting a thread.

The operational definition for this indicator is "using QA chat, telegram or email tools to start a thread; statements, trying to elicit help/sharing a problem, looking for positive feedback, exhortations, play-by-play (kind of like *Facebook*™), initiating friendship and self-disclosure." This indicator ranked 13th in frequency across all three categories with a total of 177 occurrences. This was relatively low in frequency. This is probably because one can reply many times to the same thread so not as many threads would need to be started. All "Asking Questions" quotations would fit here. However, this indicator needed to be created because not all quotations were typical questions.

I'm assuming that when certain comments like "this is weird" are made (especially by the girls), they are expecting a comment back such as "what's weird?" from others. I make this assumption partly because I have read their communication and

this is a norm, particularly with the girls. These quotations are in contexts that made me think they belong here as opposed to, for instance, “making a statement.” A lot of this could be compared to “small talk” in face-to-face situations. Actually, this social environment reminds me of a *Facebook*™ for kids where small details of life are the topic of conversation. I found the comment by F8 “I hope we dont have 2 work on are quests” interesting because she appeared to enjoy the social experience more than the cognitive. Teachers may want to consider what role social networking tools might have in creating a climate for learning in a virtual or distance environment. The use of such tools will require consideration of how to incorporate them as well as how to set parameters for their use.

It is interesting to note that while the girl students were just as likely to reply to as to start a thread (ratios remained similar), the boy students were more likely to reply to a thread than to start a thread (four dropped off almost entirely). This may confirm stereotypical thoughts about females being more extroverted at this particular age or it could be that the girls in my study are more extroverted than the boys.

Indicator I8: Visual acknowledgement.

The operational definition for this indicator is “using text that indicates visual acknowledgment or recognition of others in the environment.” This indicator ranked 16th in frequency across all three categories with a total of 101 occurrences. I included references that included “I C U” and “nice to c u again.” With the presence of avatars in this environment, it is not surprising to see students visually acknowledging others. When asked, “Do you think your avatar helps you to communicate better than when you are in a regular chat room?” all students responded positively. Answers varied somewhat when

asked further, “Why do you think that is?” Six students responded that they liked being able to see and be seen by others. Two students thought that being able to see others’ avatars helped them to feel that they knew them better. F5 said “If you have an interesting avatar, it might make people want to talk to you more.” The concept of identity as it relates to avatar-mediated communication would be a subject worthy of further investigation. It would be interesting to develop a focused study on the avatar as a representation of self and the implications for interaction in the real world. For instance, does an avatar create an alter ego for some people? Does the avatar behave differently from the person? If so, what variables influence the difference?

Indicator I9: Visual interaction.

The operational definition for this indicator is “telling others where things are, seeing the same things and doing things together like they would in the real world.” This indicator ranked fifth in frequency across all three categories with a total of 516 occurrences. This came up as a relatively high frequency indicator. The visual presence of personal avatars in the context of a virtual world environment simulated real space interactions and apparently stimulated rich communication. When asked in the interview what they thought, how they felt and what they liked about their avatars, all participants responded enthusiastically. Four students commented that they either liked or loved their avatars. Two students indicated that although they liked their avatars, they would like to have more choice in clothes. F8 said “I like my avatar, but I would like more clothes to choose from.” Several students appreciated the ability to change their appearance by customizing items such as hair and clothes. M1 said he liked how he could “make it [his] own.” The female students were unanimous in their enthusiasm about the option to

change their avatars' clothes. There were also several positive comments on the avatars' ability to move in ways such as dancing, jumping, giggling, and sleeping.

Indicator I10: Visual self-awareness.

The operational definition for this indicator is "evidence of an awareness of the avatar as an extension or representation of the participant." This indicator ranked 18th in frequency across all three categories with a total of 40 occurrences. This was the second lowest in frequency. Although low in frequency the findings in this area are intriguing. Whenever students announced that they were going somewhere or doing something they were in effect operating through or as their avatars so I included all of these comments. They identified themselves with their avatars as evidenced by the use of "I" when referring to their avatar. They seemed to see their avatar as a representation or extension of themselves. They also identified others with their avatars and accepted them as effective representations or extensions of the others. They then, by extension, see the clothes on the avatar as "theirs," portraying a sense of ownership. The fact that all students showed this, although low in frequency, could indicate that in general they identify and accept their avatars as an adequate visual representation of themselves. Another interesting point is that while using chat and telegram tools students can see the *Quest Atlantis*™ world clearly while email uses a new window that covers a substantial portion of the screen. However, the comments are similar in all cases. This suggests that even when students cannot see their avatars they are identifying with them and using them to communicate. An example is talking in email about changing avatar clothes. Also, during the interviews it was interesting to note that three students identified with their avatars by using the term "I" in speaking of them. For instance, M1 said "I'm

usually twins with someone," S5 said "I like the way I look" and M9 said "I like how I'm dressed... I like how I look."

The comment "k i'm gona try this on tell me if u like it" (F4 telegram May 26) would seem normal in real space. In the comment "I just updated my avatar," (F5 telegram) using the word avatar means she understands that, although a representation, it is separate from her. She also said, "i'm inside the peramid.! its REALLY creepy!!!!!!" (F5 telegram) An avatar can feel emotions?

Indicator I11: Making a statement.

The operational definition for this indicator is "statements that are made to no one in particular, are not responding to another post nor obviously starting a thread." This indicator ranked 15th in frequency across all three categories with a total of 153 occurrences. This is relatively low in frequency. These quotations did not fit well into any existing categories. It would be the equivalent of talking to oneself in real space, which people often do but usually when they think no one is around. I would speculate that this wouldn't happen in a real space environment. Maybe the avatars put sufficient distance between themselves and others that people do not feel the embarrassment they might feel in real space. Although students knew that their text was monitored, perhaps they forgot this or put it in the back of their minds. I decided to put this indicator in the *interactive* category as I assumed that when they were making a statement they were somehow hoping that another student would see it and initiate interaction of some kind.

When a statement appears in the chat, it could be even more unusual as the student may not be directing the statement toward anyone. When one appears in an email or telegram, it is being directed toward someone so it's not quite so unusual. Most of it

looks like small talk and could possibly be interpreted as trying to gain input from others. It kind of reminds me of the play-by-play you would get in social networking environments such as *Facebook*™ or *Twitter*™. They are saying something and not necessarily expecting a reply.

Cohesive Category

An analysis of results in the *cohesive* category will be presented in this section. *Cohesive* messages accounted for 24% of the message content. During the interview, students were asked "Do you try to help people get along in QA?" Five students did not think they had come across a situation like this but indicated that they would help if given the opportunity. The other students said they helped by answering questions and one said she tells people to "stop fighting." Then students were asked "Do you try to work with others?" to which they generally replied yes and that they do this by learning from others and showing others what they know.

Indicator C1: Vocatives.

The operational definition for this indicator is "addressing or referring to participants by name." This indicator ranked 11th in frequency across all three categories with a total of 198 occurrences. This was close to the middle in terms of frequency. There was some overlap between vocatives and phatics and salutations (communication that serves a purely social function; greetings, closures) as students often referred to others by name when greeting them. When using the chat tool it was synchronous and used by many others at once so sometimes in order to get the appropriate person's attention they needed to address them by name. During the interview students seemed hesitant to

answer the question “Do you refer to others by name in QA?” They either said no because of the I-BURST rules or yes but only by usernames. There was a subtle anxiety about revealing too much, thereby breaking the I-BURST rules.

Indicator C2: Inclusive.

The operational definition for this indicator is “addresses the group as *we, our, us, group,* including situations when students are including others, “giving” items to each other, offering friendship or making someone feel good.” This indicator ranked 10th in frequency across all three categories with a total of 224 occurrences which was mid level frequency. There was quite a few “hi everyone”s and “hi peoplz” in this section as well as “follow me.” I also included comments made to “everyone” and comments like “BFF”. M1 and M6 did not have quotations here. Five students felt that they spoke to others as a group and four felt that they did not do this. The use of inclusive pronouns takes on a different meaning in the context of a MUVE because the students are referring to their avatars when they use these pronouns and as such are vicariously (not directly) experiencing group activities. Students are moving asynchronously through a virtual world and so are apt to include each other in their “travel” arrangements.

Indicator C3: Phatics, salutations.

The operational definition for this indicator is “communication that serves a purely social function; greetings, closures, addressing questions and issues from others, whether directly asked to or not by assisting and providing relevant guidance for them.” **This includes helping others to obey the I-BURST rules, reprimanding, and giving directives**. This indicator ranked second in frequency across all three categories with a

total of 1209 occurrences. This was the second highest in terms of frequency. This is probably because there are a lot of new students and people students ran into each time they entered the world. Also, their time on *Quest Atlantis*™ was relatively short in duration so they could go on several times in a day, thereby meeting students from their class many times. It was just common courtesy to start and end an email or thread with a phatic or salutation. I included all greetings and conversation closures, everything that would be considered a salutation or phatic. The students were comfortable using informal and code language such as “biya” and “cu" and did not use formal language like “hello,” “dear,” “to” or “greetings.” This is likely due to their young age and the communication conventions they have learned in real space. Interview data is consistent with descriptive data in that all students answered positively when asked if they greeted and said goodbye to others in-world.

Indicator C4: Directional.

The operational definition for this indicator is “communication that serves a purely social function; greetings, closures, addressing questions and issues from others, whether directly asked to or not by assisting and providing relevant guidance for them.” This includes helping others to obey the I-BURST rules, reprimanding, and giving directives. This indicator ranked 12th in frequency across all three categories with a total of 181 occurrences. This was mid to low level in frequency. I included “no prob” in here as I assumed that they had assisted someone else. As teacher I received several emails from *Quest Atlantis*™ chat monitors complimenting F4 on her encouragements to others regarding obeying the I-BURST rules.

Narrative Context

The data I obtained regarding the research question "Does the narrative context of QA promote and support manifestations of social presence and if so how?" was in the form of interview results. The Legend of Atlantis, the council and the OTAK seemed to engage student interest as evidenced by comments such as "I am learning a lot about our world through QA" (M2), "I feel it's really cool cause it's like youre on a different planet." (F4), and "I think that it's a good story" (M9). When asked what they liked about them they responded; "I like that the OTAK is only in one place." (M1), "I like the story" (M3), and "I like the whole concept of the worlds" (F5). There are indications that the narrative context helps to create conditions for learning: "It helps me learn" (M7) and "I am learning more about the problems in our world and that I can help solve them." (F8). The last comment suggests that there is some translating of knowledge acquired in QA to the real space environment.

Communication Tool Usage

In this section, I discuss communication tool usage in *Quest Atlantis*™ as it pertains to manifestations of social presence. Specifically, I discuss posting frequency, posting length, message recipient and tool preference. Although there are five communication tools in *Quest Atlantis*™, all of which have the potential to support *affective*, *interactive* and *cohesive* manifestations of social presence, students in this study chose to communicate primarily with the telegram, chat and email tools. Students in my study used the first three frequently while bulletin boards were used only minimally. There were 14 bulletin board postings in total. M1, F4, F5 and F8 made a few comments and the other students did not post on the bulletin boards. Weblogs were not used at all as

the interview data indicated that none of the students were familiar with, had used or had even heard of this tool. There were some students who were not familiar with the email tool and indicated that they might have used it more often, had they known. The same could apply to the Weblogs in that, in order to offer a discerning conclusion about its use, students would need to be able to make an informed choice.

Combined student data: Posting frequency

Overall, the telegram and chat tools were used equally and email was used less frequently. However, the content volume was largest in the email posts. This could mean that the IM tools are generally preferable for shorter communication while the asynchronous email function is used for longer communication. Of interest is the fact that three students did not use email at all. I will discuss this further in my comments on individual student communication tool outcomes. In reference to *Quest Atlantis*™ communication tools Barab, et al. (2007, p.18) stated, "...girls [tended] to use all of these communication structures significantly more than boys..." Similar gender differences were found in my study with females posting at a 9:1 ratio in comparison to males.

Despite the difference in frequency, message content was similar between males and females. For instance, for both chat messages were short and used primarily for small talk. Telegram messages were longer and revealed more about the sender. Emails were more substantial than either chat or telegram messages. Topics in email messages included among others, information about countries students lived in, personal preferences in television shows, movies, music bands and hobbies, jokes, commentary on daily activities, attempts to mend relationships and instructions for various *Quest Atlantis*™ functions.

The difference in posting frequency does not necessarily mean that males did not enjoy the experience but could mean that females and males used their time in *Quest Atlantis*™ differently. While females used more time to communicate males may have instead used their time to explore the environment.. When asked what they liked about QA male students mentioned exploring, missions and games and only one mentioned talking: ``I like standing around and just walk and explore and talk, do quests if you have some`` (M1). All females mentioned that they liked communicating and socializing as well as exploring and changing avatar clothes. Barab et al. (2007) found that males and females expressed enthusiasm for the fantastical QA environment, that there were ways for both to participate and that although one may have more voice in one area such as communication or game-playing skills, neither sex was dominant in their participation in-world.

Combined student data: Posting length

Chat messages were the shortest in length, likely due to the public nature of this tool. Telegrams were somewhat longer as they are private messages from one sender to one recipient. Emails were generally short for males and much longer for females. This is likely because messages are private and because the tool is used asynchronously, time can be allotted to the construction of the message. In terms of posting lenth, when using telegrams, the females used on average two more words than the males. When using the chat function the females and males used equal numbers of words. It was with the email function where there was a vast discrepancy between genders with females using 22 more words per message than the males. It would seem that the telegram and especially chat functions promoted manifestations of social presence approximately equally for males

and females whereas where the email function did not promote many manifestations of social presence for the males, it was highly successful for the females. Of the males who did not use email to communicate, one said that he enjoyed receiving emails but would rather use telegrams to send messages, one said that he did not know how to use the email function and the other said although he checked his emails, he did not send messages by email.

Combined student data: Tool preference

A conclusion about tool preference would depend on what is used to indicate preference, namely, frequency or message volume. If the former is the criterion, all students preferred the IM tools telegram and chat. If the latter is used as the primary criterion, some of the students preferred the asynchronous email tool. It is interesting to note that the order of preference remained the same for the male students whether measuring by frequency or message volume. For females, order of preference in terms of frequency was chat, telegram and email, whereas in terms of volume the order of preference was email, telegram and chat.

Although three of the male students did not send emails, use of the bulletin board tool was minimal and weblogs were not used at all, this does not necessarily mean that students disliked these tools. Two students who did not send emails indicated that they did use the tool: “I like it when I get one” (M3), “I've gone to check my emails I just haven't sent one” (M9).The third student said that he did not know how to use the tool. Responses about email from the other male students varied: “There’s nothing to like or dislike about it” (M1), “they can get really cluttered and I don't like to spend my entire time answering emails” (M2), “Very comfortable because nobody else can see what you

send” (M9). All the female students responded positively about the email tool: F4: “It’s really fun because when you come on it’s really fun because you might have new mail that you can check. It’s a helpful thing.” F5: “I like it cause you can communicate with your friends and you can talk about stuff on QA and I like typing”, F8 “I like that you can talk to people. We can talk about QA or things we are doing.”

Despite low usage the majority of the students responded positively when asked about the bulletin board tool: “I like it when people have lots of opinions and people get to share them” (M1), “I thinks it’s useful because it give you the latest news and information” (M3), “It’s really fun because you can add new subjects and you can reply to subjects and you can use icons” (F4), “I think it is neat to hear what people's ideas are.” (F5), “They are interesting to read” (M6), “You post how you feel about certain things” (M7), “I like checking the BB to see if there is anything new and I like replying and making new things” (F8). The other two students were more neutral: “I am not interested really” (M2), “It's alright” (M9). There were no findings regarding the weblogs as most students said they did not know whether or not they liked them as they had not yet heard about this tool.

Chapter Six: Conclusions and Commentary

This is perhaps the most beautiful time in human history; it is really pregnant with all kinds of creative possibilities made possible by science and technology which now constitute the slave of man - if man is not enslaved by it. ~Jonas Salk (in Poway Unified School District

This study was conducted to examine the manifestations of social presence by nine participants, aged 8 to 13 in the context of a multi-user virtual environment (MUVE) and to subsequently analyze the results for potential significance. This was a unique study environment from which a rich set of data emerged, containing numerous instances of social presence. Various factors emerged as possible influences on the type and quantity of social presence exhibited. Of significance interest were the results as they related to the research questions for this study. The manifestations of social presence were *affective*, *interactive* and *cohesive* in nature and occurred to varying degrees between participants. The data related to the narrative context of QA, although interesting, was limited. This area contains many possibilities for further research. Data related to communication tool usage was rich and yielded some interesting results. The parameters for communication in *Quest Atlantis*™ called the "I-BURST" rules had an impact on the degree to which participants revealed themselves in the virtual world. Although I did not intend to include gender differences as a variable in my study, critical distinctions between male and female communication patterns did emerge.

All but two students expressed themselves *affectively* in *Quest Atlantis*™ through expressions of emotion, humour, self-disclosure and creative expression. Expression of emotion was dominant, accounting for 64% of the *affective* communication and in-world self-disclosure was the least common, accounting for only 3%. Creative expression was exclusively female in this study. One male in particular is very artistic so perhaps the

male students did not enjoy this form of artistic expression while the females found it to be a way to incorporate their creativity into this environment.

Interactive expressions of communication were more common than either *affective* or *cohesive* expressions. Students communicated openly with others 67% of the time through replying to comments, asking questions and making comments to encourage visual interaction. Students only used higher order communication skills such as quoting or referring 2% of the time, likely because of their young age. Students also initiated communication, complimented and agreed with each other and made comments that evidenced the visual nature of their communication. Text that included references to visual observations and interactions accounted for 18% of the *interactive* message content. This was confirmation for the decision to include three new indicators in this category to capture the associated data and to recognize the importance of the visual component in promoting and supporting manifestations of social presence in virtual worlds. This finding could have pedagogical implications for designing computer-mediated environments points that hope to engage learners in this age group as it seems that avatar-mediated communication was an important factor in student interactions.

Students initiated group cohesiveness 67% of the time by greeting and saying goodbye to each other and exchanging social niceties. The rest of the time they attempted to include others in their in-world activities, addressed others by name and assisted other students in various ways. Students engaged in this type of communication to a similar degree as they engaged in *affective* communication.

Although I did not obtain much data on how the narrative context of QA promoted or supported manifestations of social presence, student comments during the

interviews suggested that it was an important factor. Overall, students felt that the fictional story behind QA "the Legend of Atlantis", the fictional avatars called the "Council" and the common meeting place called the "OTAK" were entertaining, interesting and informative. Some felt that these helped them to learn about problems in the real world and about personal actions they could take to solve them. Students liked the fantasy backdrop. One student felt that QA took her to another world and another mentioned liking the concept of worlds. The effect of the visual avatar-mediated communication on how the students projected themselves socially surfaced as important within the limited data obtained during the interviews. Students liked the avatars and felt that they helped them communicate better than they would in, for example, a chat room without avatars. Students felt that they could get to know the person better by becoming acquainted with his or her avatar including imagining what the person might look like. F5 made an interesting comment about why avatars helped her communicate better: "Because if you have an interesting avatar it might make people want to talk to you more....."

Mehrabian (1969) and Kiesler, Siegel & McGuire (1984) suggested that nonverbal cues were important factors in establishing favourable conditions for *affective* communication. Subsequent research questioned the ability of computer mediated communication to create such conditions due to the lack of visual nonverbal cues (Short, Williams & Christie, 1976; Vrasidas & McIsaac, 2000; Hiltz, 1986) and the lack of social context cues (Sproull & Keisler, 1986). Later research (Walther, 1994) indicated that text based computer mediated communication such as email could promote some forms of communication as well as or better than audio or face-to-face. Rourke, et al. (1999) stated

that “the capacity of CMC to support highly *affective* interpersonal interactions is supported by studies that focus on its use in educational settings” (p.2). In this study, communication was rich in both frequency and volume. This could be due in part to the visual nature and purpose of the environment, specifically; the ability of avatars to convey, to a certain degree, nonverbal cues; the provision of social context cues or parameters within the virtual world and the presence of tools to effectively facilitate text based communication.

Tool selection and preferences also influenced manifestations of social presence. Communication tools promoted manifestations of social presence in a variety of ways and to varying degrees. It was primarily the chat, telegram and email relational tools in *Quest Atlantis*™ that promoted and supported manifestations of social presence. Tool preference depended on whether it was measured by frequency or volume and on whether the user was male or female. In terms of frequency, all students preferred to use the chat and telegram tools. This could indicate that Instant Messaging tools are more comfortable, convenient and effective for students to use in a social manner. In terms of message volume, the female students preferred to use the email tool while male students used email minimally and in some cases not at all. The fact that the tools all required typing skills and that the students were relatively young could explain the adoption of conventions for communication such as abbreviations and keyboard functions to convey messages. Telegram and chat messages were sent to both class and non-class members while emails were primarily sent to class members. Perhaps the IM tools were preferable for short, communication with strangers or for practical purposes and emails were more comfortable for communicating more in-depth thoughts with known recipients. This

could have pedagogical implications for the integration of similar tools in learning environments. For instance, email could be used to provoke thoughtful, in-depth communication whereas IM tools could be used to build social networks and trust. Also, the tools, while visual are text-based so instructors would need to plan for a range of typing skills in students.

Two interview questions brought the I-BURST rules into focus as possible hindrances to communication. Students were aware that if they broke these rules they would be in danger of expulsion from the world. When asked, “Do you talk about yourself in QA?” all the male students answered negatively, two of them indicating that they did not want to break the I-BURST rules. All the female students answered positively. When asked, “Do you refer to others by name in QA?” all students seemed careful in their answers, revealing a heightened awareness of the I-BURST rules. There are positive and negative aspects to censoring virtual identity sharing. Surveillance provides increased stability and security, particularly with a vulnerable age group such as the one involved in this study, but there may also be a limiting of possibilities for relationship building, innovation and creative expression. This brings up the concept of virtual identity. In the pre-technology world a person could move around geographically, creating new identities in each place. There is a re-emergence of this phenomenon in the online world where a person can have several identities in various virtual places.

As mentioned earlier, this study did not directly address any questions with regard to gender. However, discrepancies were so pronounced that they are worthy of mention. Manifestations of social presence differed according to gender in type, quantity and method of communication. Females had messages for indicators in every category while

two males had no *affective* posts. Females consistently posted more frequently than males and with the exception of chat, their messages were longer. Is the *Quest Atlantis*™ environment more conducive for female interaction in terms of tool design? If so, is this positive or negative and in what ways does it promote female participation?

Extensions for Research

While Research at the adult level can inform and provide a context for research at the K-12 level, there is also growing recognition of the need for further research at the K-12 level. Opportunities for research in this area are numerous. Studies such as Murphy (2004) conducted with adults, regarding collaboration in virtual learning communities, could be adapted and replicated within K-12 virtual learning communities. Schwier's (2007) work on catalysts, emphases and elements with respect to adult VLCs could inform and provide a context for studying characteristics of K-12 virtual learning communities. Additionally, action or design-based research where the researcher is the practitioner and the goal is improved quality of learning could be conducted within K-12 learning environments. For instance, studies with specific age groups, that focus on gender similarities and differences and/or tool usage could be conducted in the context of traditional or online classrooms.

There are many opportunities for investigation surface in the area of K-12 virtual worlds and several issues and insights precipitate careful consideration and investigation into effective design of VLCs at the K-12 level. For instance, computer-mediated communication is different from face-to-face communication, and there are indications that adult VLCs are and will be different from K-12 VLCs. Research regarding how social presence is manifested, effective use of communication tools and integration of

virtual worlds could serve to enhance student learning.

Nippard and Murphy (2007) indicated that social presence has an impact on students' perception of learning, might serve to increase student satisfaction in their experiences online, and may promote emotional satisfaction for students. An area that deserves further investigation is how students tend to manifest social presence, primarily when digressing from curricular topics. For instance, they use communication "conventions transferred from informal social contexts of instant messaging such as ICQ and MSN" (Nippard & Murphy, 2007, p.1). Levin & Arafeh (2002) pointed out the fact that "many schools and teachers have not yet recognized - much less responded to - the new ways students communicate and access information over the Internet" (p. iii). The difference in tool preference between teachers and students is also worthy of further research consideration (Nippard & Murphy, 2007). With the independence afforded by new technologies in the context of K-12 virtual learning communities, Turvey (2006) raised the question of assessing student responsibility. The findings of this study could serve as a launching point for further investigation into how instant messaging tools can be most effectively used to promote social presence in educational contexts. Action research could integrate research into practice by assisting in the development of best practices for the educational use of IM tools in creating favourable conditions for manifestations of social presence.

It would be beneficial to conduct further research in a virtual environment that, in addition to text, utilizes audio and audio/video for avatar-to-avatar communication and to study the effects on manifestations of social presence. It would also be interesting to

explore the emergence of new cues in computer mediated communication that take the place of non-verbal cues inherent in face-to-face interactions.

Issues around the area of how to express identity in virtual settings could be examined. It would be interesting to examine various chat and online educational environments in terms of rules and how they came to be, as well as how people express themselves to the degree they want within the confines of those rules. Studies of protocol in the establishment of conduct rules could inform pedagogy in terms of best practices for effectively engaging young students.

Future inquiry such as follow-up studies that are more in-depth, survey a greater number of participants and address a variety of age groups could provide insight as to possible reasons for gender differences in manifestations of social presence in virtual worlds and possibly inform design and implementation of these environments.

According to Lim (2006) questions arise in *Quest Atlantis*™ surrounding the relationship between complexity, educational nature of quest design and levels of student engagement. Barab et al. (2005) identified a need for further investigation into "how complex and 'educational' these academic Quests can be while still engaging students" (p.6).

Multi-user virtual environments as a type of virtual learning community is a phenomenon that holds promise and challenge for the future of K-12 education. It is important to recognize not only that communication in a virtual context is different from communication in a face-to-face context, but also that adult communication is different from communication at the K-12 level. These distinctions have an impact on the valuing, formation and sustenance of K-12 virtual learning communities and integration of virtual

worlds such as *Quest Atlantis*™. A model such as the "community of inquiry" could inform the effective use of MUVEs in learning environments.

Social presence is only one of three core elements in the larger context of the COI model. Although this study focused on social presence, questions arise regarding how social presence is linked to cognitive and teaching presence. What should the role of social presence be in a virtual learning environment? According to Garrison (2007) "Social presence for educational purposes cannot be artificially separated from the purposeful nature of educational communication (i.e., cognitive and teaching presence)" (p.5). Although in an online community of inquiry such as *Quest Atlantis*™, social presence plays an integral role, how much is enough to support learning and at what point does it create distractions and detract from learning by moving away from curricular goals? In order to determine appropriate levels of social presence in a virtual world, research endeavours could explore the effect of specific variables such as collaboration or the presence of avatars on manifestations of social presence. How do different amounts of social presence affect cognition and collaborative learning in a virtual world? How does social presence in a virtual world relate to manifestations of social presence in the real space learning environment?

Multi-user virtual environments are only part of the much larger picture of real space and virtual K-12 education but are important because of the possibilities they hold. They provide opportunities for technology to be used in learning environments in relevant ways that appeal to younger students. Affordances include narrative story lines to engage students, communication and collaboration tools to address social and cognitive goals, and customizable features to promote virtual identity creation.

Examination of social, cognitive and teaching presence in these contexts could provide valuable insights and could inform the design and development of virtual worlds within K-12 educational contexts.

References

Alexander, B. (2006). Web 2.0: A new wave of innovation for teaching and learning? *Educause Review*, *41*(2) (March/April). Retrieved July 10, 2009 from http://www.educause.edu/ir/library/pdf/ERM0621.pdf

All the Best Quotes (n.d.). Retrieved July 11, 2009, from http://chatna.com/author/salkjonas.htm

Barab, S., Dodge, T., Tuzun, H., Job-Sluder, K., Jackson, C., Arici, et al. (2007). *The Quest Atlantis project: A socially-responsive play space for learning.* Manuscript submitted for publication

Barab, S., MaKinster, JG, Moore, J., Cunningham, D., & the ILF Design Team (2001) Designing and building an online community: The struggle to support sociability in the inquiry learning forum. *Educational Technology Research and Development 49(4),* 71-96.

Barab, S. (2009) *Quest Atlantis,* Retrieved June 11, 2009 from http://atlantis.crlt.indiana.edu/#44

Barbour, M.K., *Virtual high school meanderings: A need for a common language.* Retrieved January 28, 2008 from http://mkbnl.blogspot.com/2008/01/need-for-common-language.html

Beldarrain, Y. (2006). Distance education trends: Integrating new technologies to foster student interaction and collaboration. *Distance Education, 27*(2), 139.

Blaisdell, M. (2006). Educational gaming: All the right MUVEs. *T.H.E.Journal, 33*(14), 28-38.

Brown, J.S., & Adler, R.P. (2008). *Educause review: Minds on fire: Open education, the long tail, and learning 2.0.* Retrieved February 8, 2008, from http://connect.educause.edu/Library/EDUCAUSE+Review/MindsonFireOpenEducationt/45823?time=1201726880

Brown, J. S., Collins, A., & Duguid, P. (1989). Situated cognition and the culture of learning. *Educational Researcher*, *18* (1), 32-41.)

Burell, C. (2008) *Beyond school: Networked learning.* Retrieved February 14, 2008 from http://beyond-school.org/2008/02/13/podcast-with-dean-shareski-on-_natural_-global-collaboration-and-networked-learning/

Childress, M. D., & Braswell, R. (2006). Using massively multiplayer online role-playing games for online learning. *Distance Education, 27*(2), 187-196.

Coffman, T. (2004). *Online professional development: Transferring skills learned to the classroom.* Unpublished doctoral dissertation, Capella University – Minneapolis, Minnesota.

Dede C., Dieterle E., Clarke J., Ketelhut D. & Nelson, B. (2007). Media-based learning styles. In M. Moore (Ed.), *Handbook of Distance Education* (pp. 339-351). Retrieved July 10, 2009 from http://books.google.ca/books?hl=en&lr=&id=MA9-Q73SeesC&oi=fnd&pg=PA339&dq=muve+3-D+simulate+global&ots=Wc9Wzwzyfx&sig=IbjjkEsIL8DFU1hjDfmUiaXIPh0

Downes, S. (1998). The future of online learning. Retrieved February 4, 2008 from http://www.westga.edu/~distance/downes13.html

Downs , M., & Moller, L. (1999). Experiences of students, teachers, and administrators in a distance education course. *International Journal of*

Educational Technology. *1*(2). Retrieved March 10, 2008, from http://smi.curtin.edu.au/ijet/v1n2/downs/index.html

Gall, M., Borg, W., & Gall, J. (1996). *Educational research: An introduction* (6th ed.) New York: Longman.

Garrison, D. R., Anderson, T., & Archer, W. (2000). Critical inquiry in a text-based environment: Computer conferencing in higher education. *The Internet and Higher Education, 2*(2–3), 87–105.

Garrison, D. R. (2007). Online community of inquiry review: Social, cognitive, and teaching presence issues. *Journal of Asynchronous Learning Networks, 11*(1), 61-72.

Gordin, D., Gomez, L., Pea, R., & Fishman, B. (1996). Using the World Wide Web to build learning communities in K-12. *Journal of Computer-Mediated Communication, 2*(3).

Grabinger, R. & Dunlap, J. (1995) Rich environments for active learning: a definition, *Association for Learning Technology Journal*, 3(2), pp. 5-34.

Herrington, J., Oliver, R. & Reeves, T. C. (2003). Patterns of engagement in authentic online learning environments. *Australian Journal of Educational Technology*, *19*, 1, 59–71.

Hiltz, S. R. (1986). The “virtual classroom”: using computer-mediated communication for university teaching. vol 36 iss 2 pa 95-104 = “the “virtual classroom”: using cmc for university teaching. *The Journal of Communication, 36* (2), 95-104. Retrieved July 20, 2009 from www.interscience.wiley.com

Kiesler, S., Siegel, J. and McGuire, J.W. (1984), "Social Psychological Aspects of Computer-Mediated Communication," *American Psychologist,* 39, 1123-1134.. Retrieved July 31, 2009 from http://lkisselburgh.com/files/Library/COM590Rajan/week%202/kiesler%20+%20siegel%20+%20mcguire%20-%20soc%20psych%20aspects%20of%20cmc.pdf

Lim, C., Nonis, D., & Hedberg, J. (2006). Gaming in a 3D multiuser virtual environment: Engaging students in science lessons. *British Journal of Educational Technology 37*(2), 211-231.

Linden, Zee. (2006) *Growth of Second Life Community and Economy: User Hours,* Retrieved June 11, 2009 from https://blogs.secondlife.com/community/features/blog/2006/12/12/growth-of-second-life-community-and economy

Litera (n.d.). Retrieved July 11, 2009, from http://www.litera.co.uk/author/henry_miller/

McCombs, B. L. (2003). A framework for the redesign of K-12 education in the context of current educational reform. *Theory into Practice, 42*(2), 93-101.

Mcloughlin, C. (n.d.). How does the quality debate relate to the nature of the student experience online? Retrieved February 5, 2008 from: http://www.ecu.edu.au/conferences/tlf/2003/pub/pdf/19_McLoughlin_Catherine.pdf

McLoughlin, C. & Lee, M. J. W. (2007). Social software and participatory learning: Extending pedagogical choices with technology affordances in the Web 2.0 era, *Proc. of the 24th Conf. ASCILITE*, Singapore, 2007, 664-675.

Retrieved July 10, 2009 from http://www.ascilite.org.au/conferences/singapore07/procs/mcloughlin.pdf

McLuhan, M, & Fiore, Q. (1967). *The medium is the massage*. New York: Bantam Books.

Mehrabian, A. (1969). Some referents and measures of nonverbal behavior. *Behavior Research Methods and Instrumentation, 1*(6), 205-207.

Merriam, S.B. (1998). *Qualitative research and case study applications in education.* San Francisco, CA: Jossey-Bass Inc.

Murphy, E. (undated). E-teaching. Retrieved Mar. 26, 2008 from http://www.youtube.com/watch?v=GX94ws03o3o

Murphy, E. (2003). Moving from theory to practice in the design of web-based learning from the perspective of Constructivism. *The Journal of Interactive Online Learning, 1*, (4). Retrieved July 10, 2009 from http://www.ncolr.org/jiol/issues/PDF/1.4.4.pdf

Murphy, E., & Coffin, G. (2003). Synchronous communication in a web-based senior high school course: Maximizing affordances and minimizing constraints of the tool. *American Journal of Distance Education, 17*(4), 235-246.

Murphy, E. (2004). Recognising and promoting collaboration in an online asynchronous discussion. Retrieved January 20, 2008, from http://www.blackwell-synergy.com.cyber.usask.ca/links/doi/10.1111/j.0007-1013.2004.00401.x

Murphy, E. (2005). Issues in the adoption of broadband-enabled learning. *British Journal of Educational Technology, 36*(3), 525-536.

Nelson, B., Ketelhut, D., Clarke, J., Bowman, C., & Dede, C. (2005). Design-based research strategies for developing a scientific inquiry curriculum in a multi-user virtual environment. *Educational Technology, 45*(1), 21–28.

Nippard, E., & Murphy, E. (2007). Social presence in the web-based synchronous secondary classroom. *CANADIAN JOURNAL OF LEARNING AND TECHNOLOGY, 33*(1), 109.

O'Reilly, Tim (2005) What is Web 2.0? Retrieved July 10, 2009 from www.oreillynet.com/pub/a/oreilly/tim/news/2005/09/30/what-is-Web-20.html?page=1

Palincsar, A. (1998). Social constructivist perspectives on teaching and learning. *1998 Annual Review of Psychology, 49*, 345.

Palloff, R. M., & Pratt, K. (1999). Building learning communities in cyberspace: Effective strategies for the online classroom. San Francisco: Jossey-Bass.

Parker, K R & Chao J T 2007, Wiki as a Teaching Tool. *Interdisciplinary Journal of Knowledge and Learning Objects* Volume 3, 2007

Pea, R. (2002). Learning science through collaborative visualization over the Internet. Nobel Symposium (NS 120), *"Virtual Museums and Public Understanding of Science and Culture,"* May 26-29, 2002, Stockholm, Sweden.

Poway Unified School District (n.d.). EdTech Central: Gate family technology night. Retrieved July 11, 2009, from *http://www.powayusd.com/projects/EdTechcentral/GATE/GATETechNight.htm*

Prensky, M. (2001a). Digital natives, digital immigrants. Retrieved March 27, 2008 from On the Horizon: http://www.marcprensky.com/writing/Prensky%20-%20Digital%20Natives,%20Digital%20Immigrants%20-%20Part1.pdf

Prensky, M. (2001b). Digital game-based learning. New York. McGraw-Hill.

Ravitz, J. (1997). An ISD model for building online communities: Furthering the dialogue. IR 018 452.

Rosenberg, M.J. (2001). *e-Learning: Strategies for delivering knowledge in the digital age*. New York: McGraw Hill.(p.3)

Rourke, L., Anderson, T., Garrison, D. R., & Archer, W. (2001). Assessing social presence in asynchronous, text-based computer conferencing. *Journal of Distance Education*, *14*(3), 51–70.

Sadik, A. (2003). Directions for future research in on-line distance education. *Turkish Online Journal of Distance Education,* 4(4). Retrieved November 21, 2004, from: http://tojde.anadolu.edu.tr/tojde12/articles/sadik.htm

Schwier, R.A. (2007). A typology of catalysts, emphases and elements of virtual learning communities. In R. Luppicini (Ed.), *Trends in distance education: A focus on communities of learning (p.1, 17).* Greenwich, CT: Information Age Publishing

Second Life Website (2009. Economic Statistics (Raw Data Files): logged in users.xls. Retrieved July 9, 2009, from http://secondlife.com/statistics/economy-data.php

Second Life Wikia. (2004) *First Birthday Event: Overview,* Retrieved June 11, 2009, from http://secondlife.wikia.com/wiki/First_Birthday_Event

Shareski, D. (2008). *Ideas and thoughts from an EdTech.* Retrieved January 28, 2008, from http://ideasandthoughts.org/ ;*The Great Debates*. Retrieved February 4 2008 from http://ideasandthoughts.org/2008/01/16/the-great-debates/

Short, J., Williams, E., & Christie, B. (1976). *The social psychology of telecommunications*. Toronto, ON: Wiley.

Solis, Brian. (2009). Unveiling the New Influencers*.* Retrieved July 9, 2009, from http://www.briansolis.com/2009/06/unveiling-the-new-influencers/

Sproull, L., & Keisler, S. (1986). Reducing social context cues: Electronic mail in organizational communication. *Management Science, 32*, 1492-1513.

Squire, K. D. (2002). Cultural framing of computer/video games. *Game Studies* , *2*, 1. Retrieved March 27, 2008, from http://gamestudies.org/0102/squire.

Stuckey, B., & Barab, S. A. (in press). Web-Supported Communities: Why Good Design Isn't Enough. To appear in C. Haythornthwaite, Handbook of Elearning Research. London, Sage.

Tapscott, D. (1999). Educating the net generation. *Educational Leadership, 56*(5), 6.

Turvey, K. (2006). Towards deeper learning through creativity within online communities in primary education. *Computers and Education, 46*(3), 309-321.

Uribe, E. (Undated). Learner Centered Principles in Distance Education. Retrieved February 5, 2008 from: http://itec.sfsu.edu/wp/860wp/F05_860_uribe.pdf

Vrasidas C and Mclsaac M S (2000). Principles of pedagogy and evaluation for web-based learning. Education Media International 37 (2) 105-111.

Walther, J. (1994). Interpersonal effects in computer mediated interaction. *Communication Research, 21*(4), 460-487.

Wieneke, Nutzel & Arnold (2007). Life 1.5: Creating a task based reward structure in second life to encourage and direct user created content, in *International Cultural Heritage Informatics Meeting (ICHIM07): Proceedings*, J. Trant and D. Bearman (eds). Toronto: Archives & Museum Informatics. 2007. Published October 24, 2007 at http://www.archimuse.com/ichim07/papers/wieneke/wieneke.html Retrieved July 21, 2009, from http://www.archimuse.com/ichim07/papers/wieneke/wieneke.html

Appendices

Appendix A:

Rourke et al. (2001) Instrument for assessing social presence.

Category	Indicators	Definition	Example
Affective	Expression of emotions	Conventional expressions of emotion or unconventional expressions of emotion. Includes repetitious punctuation, conspicuous capitalization, emoticons.	"I just can't stand it when…!!!!" "ANYBODY OUT THERE!"
	Use of humor	Teasing, cajoling, irony, understatements, sarcasm.	The banana crop in Edmonton is looking good this year)
	Self-disclosure	Presents details of life outside of class, or expresses vulnerability.	"Where I work, this is what we do …" "I just don't understand this question"
Interactive	Continuing a thread	Using reply feature of software rather than starting a new thread.	Software dependant, e.g, "Subject: re" or "Branch from"
	Quoting from others' messages	Using software features to quote others' entire message or cutting and pasting selections of others' messages.	Software dependant, e.g, "Martha writes;" or text prefaced by less-than symbol <.
	Referring explicitly to others' messages	Direct references to contents of others' posts.	"In your message you talked about Moore's distinction between …"
	Asking questions	Students as questions of other students or the moderator.	"Anyone else had experience with WebCT?"
	Complimenting, expressing appreciation	Complimenting others or contents of others' messages.	"I really like your interpretation of the reading"
	Expressing agreement	Expressing agreement with others or content of others' messages.	"I was thinking the same thing. You really hit the nail on the head".
Cohesive	Vocatives	Addressing or referring to participants by name.	"I think John made a good point." "John, what do you think?"
	Addresses or refers to the group using inclusive pronouns	Addresses the group as *we, us, our, group*	"Our textbook refers to …" "I think we veered off track …"
	Phatics, salutations	Communication that serves a purely social function; greetings, closures.	"Hi all" "That's it for now" "We're having the most beautiful weather here"

Appendix B:

Interview Guide

1. Do you like QA? Do you feel comfortable there?

2. Are you able to express how you feel about things in QA? If so, how do you do this?
    a. Do you joke with others sometimes?
    b. Do you talk about yourself? If not, why not?

3. Are you able to talk easily with others in QA? If so what makes this happen?
    a. Do you reply when someone talks to you?
    b. When you are talking to someone do you mention what others have said to you?
    c. Do you ask questions of other students or teachers?
    d. Do you give compliments or thank others?
    e. Do you tell others when you agree with what someone has said? If not, what stops you or makes you feel uncomfortable?

4. Do you try to help people get along in QA? Do you try to work with others? If so, how do you make this happen?
    a. Do you refer to others by name in QA?
    b. Do you talk to others as a group?
    c. Do you greet others and say goodbye? If not, is there anything that stops you?

5. What do you think about the Legend of Atlantis, the Council and the OTAK?
    a. How do you feel about them?
    b. What do you like about them?
    c. What do you dislike about them?

6. What do you think or how do you feel about using chat to communicate in QA?
    a. Do you use it to talk to others?
    b. How do you feel about it?
    c. What do you like about it?
    d. What do you dislike about it?
    e. Why do you use it more?
    f. What do you think or how do you feel about communicating with telegrams in QA? Why do you use it more?

7. What do you think or how do you feel about using email to communicate in QA?
    a. Do you use it to talk with others?
    b. Do you read the mail in your inbox?

c. How do you feel about it?
d. What do you like about it?
e. What do you dislike about it?

8. What do you think about the Bulletin boards?
    a. Do you post messages on them?
    b. How do you feel about them?
    c. What do you like about them?
    d. What do you dislike about them?

9. What do you think about the blogs?
    a. Do you post messages on them?
    b. How do you feel about them?
    c. What do you like about them?
    d. What do you dislike about them?

10. What is your favourite way or ways to communicate in QA?

11. What do you think or how do you feel about your avatar?
    a. How do you feel about it?
    b. What do you like about it?
    c. What do you dislike about it?
    d. Do you think your avatar helps you to communicate better than when you are in a regular chat room (when you don't have an avatar)? If so, why do you think that is?

12. What do you like best about QA?

13. Is there anything you dislike about QA?

Appendix C:

Individual Student: Communication Method Comparison and Posting Length

Student 1

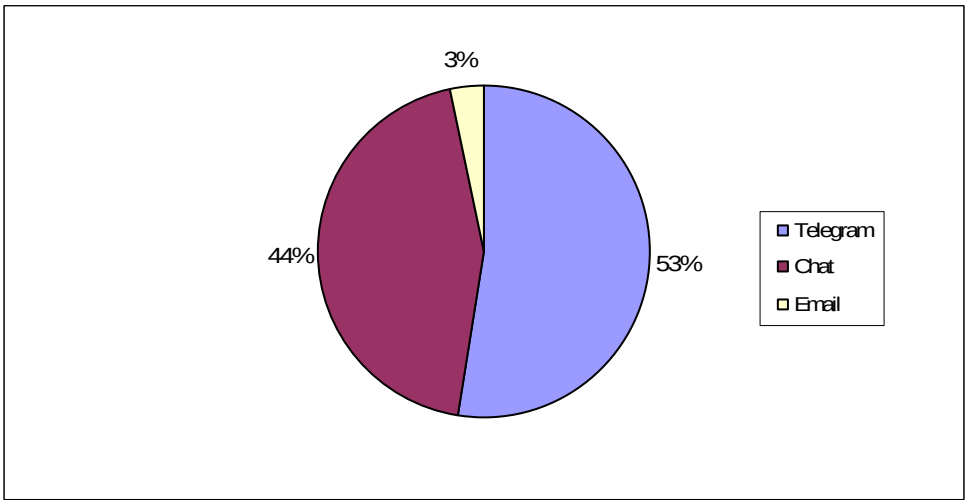

Figure C1. M1 Communication method comparison.

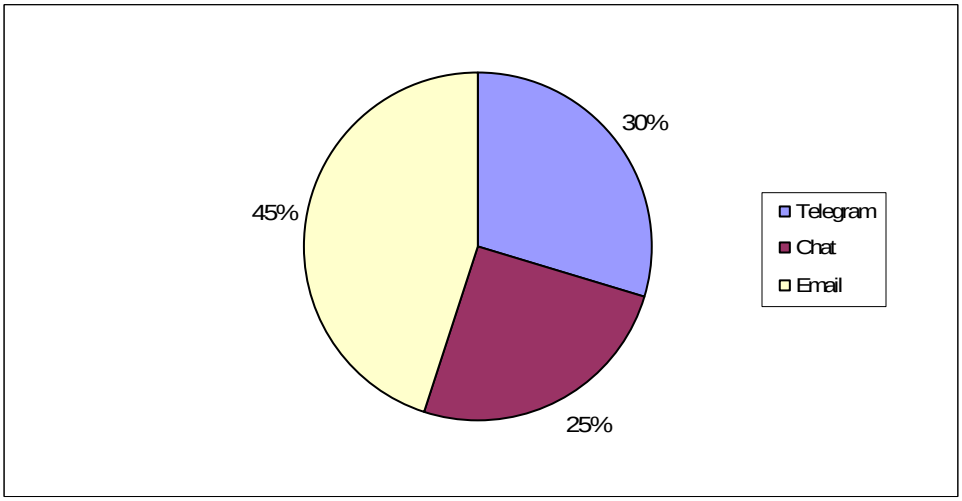

Figure C2. M1 Post length comparison.

Student 2

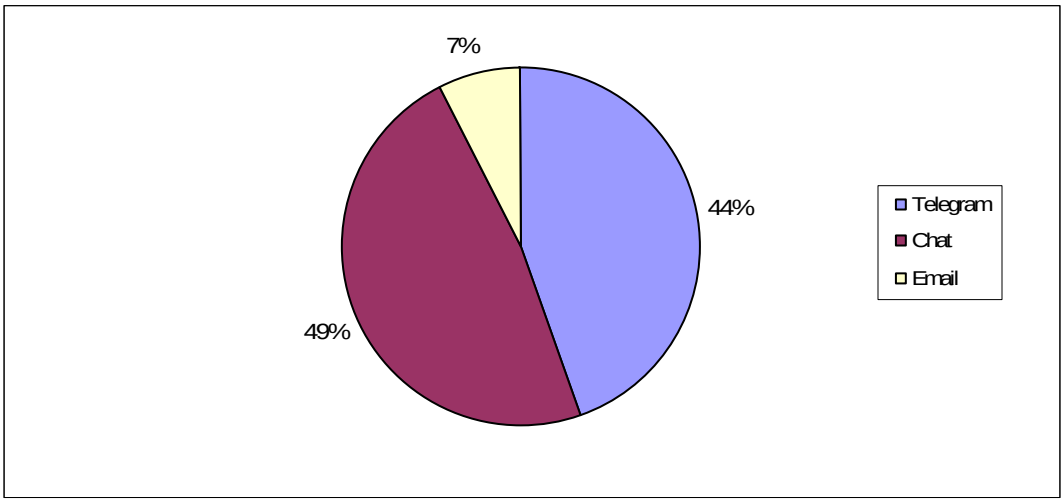

Figure C3. M2 Communication method comparison.

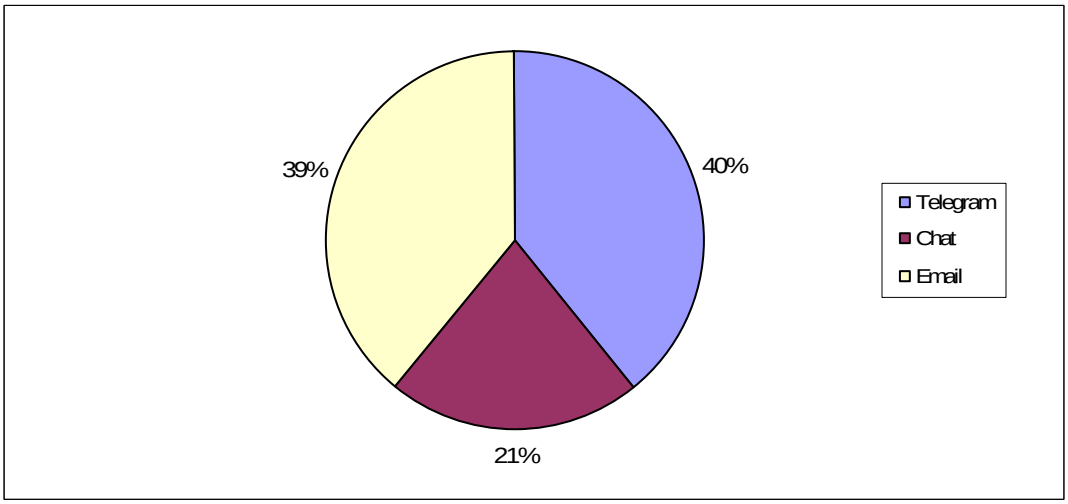

Figure C4. M2 Post length comparison.

Student 3

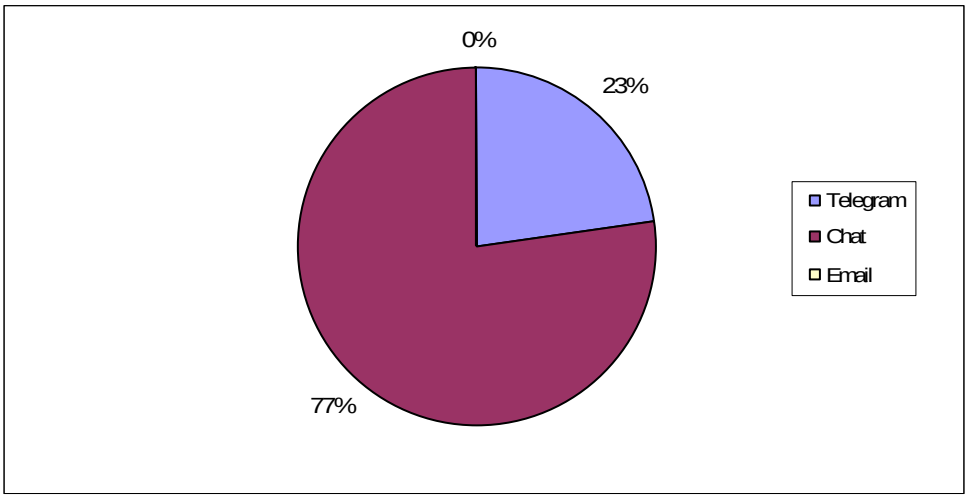

Figure C5. M3 Communication method comparison.

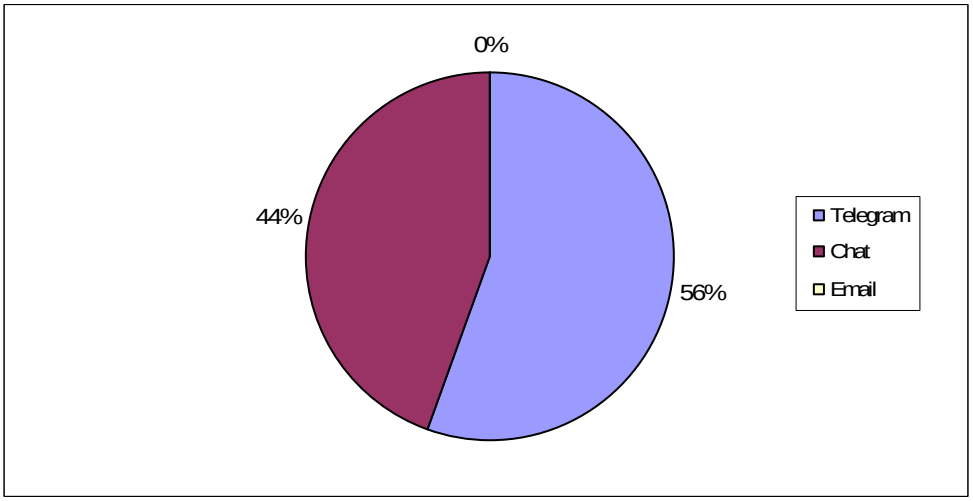

Figure C6. M3 Post length comparison.

Student 4

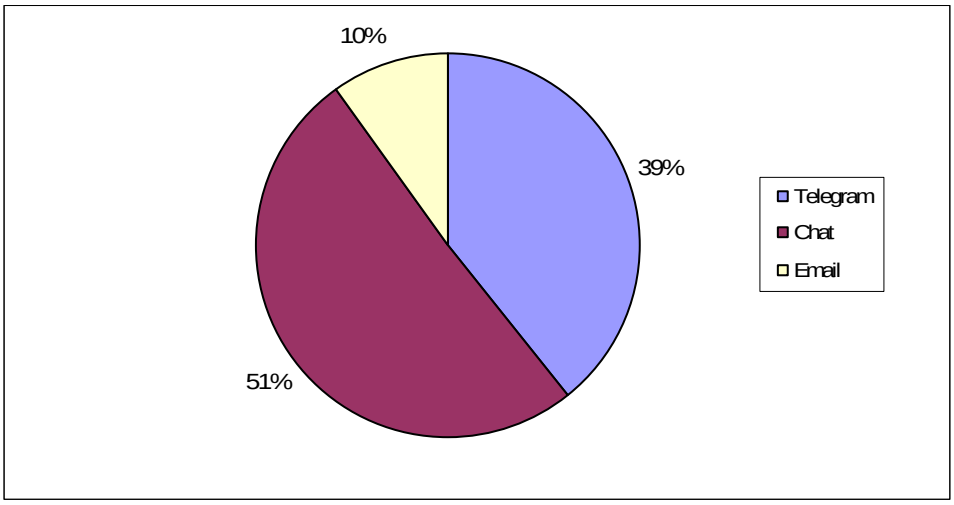

Figure C7. F4 Communication method comparison.

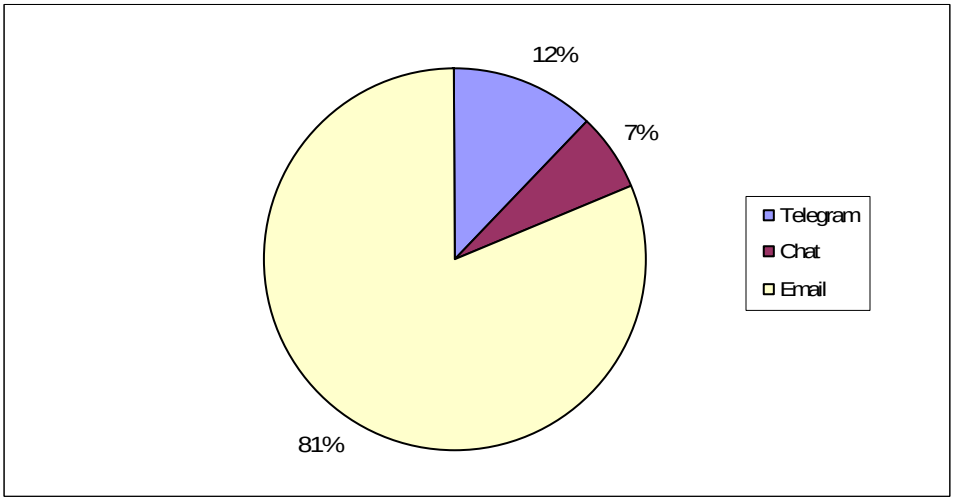

Figure C8. F4 Post length comparison.

Student 5

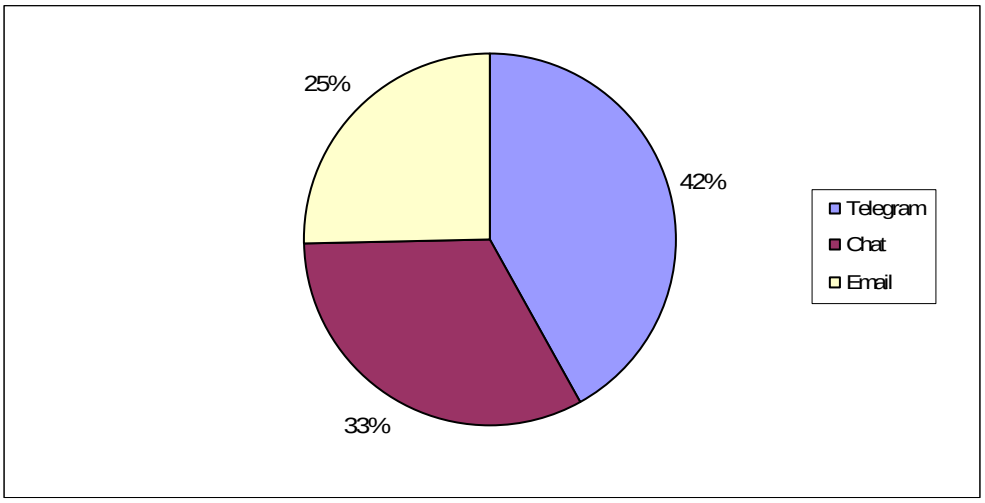

Figure C9. F5 Communication method comparison.

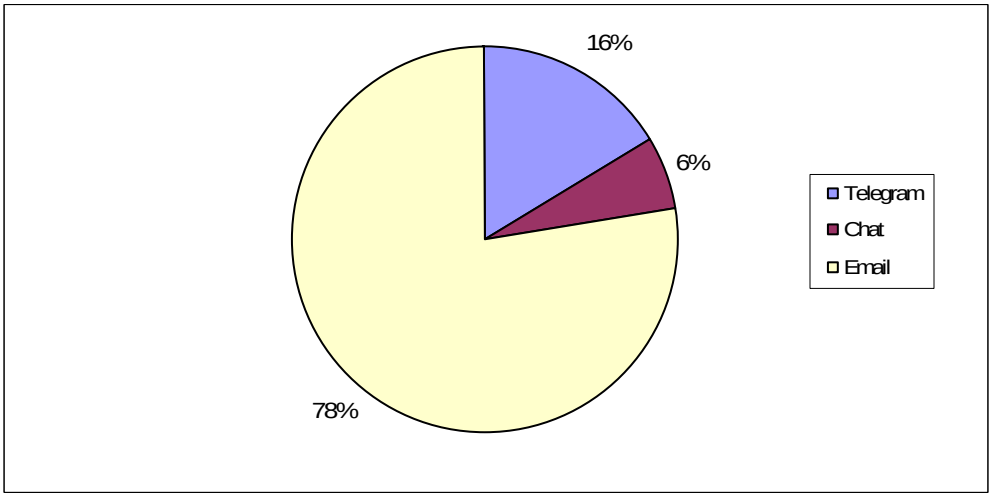

Figure C10. F5 Post length comparison.

Student 6

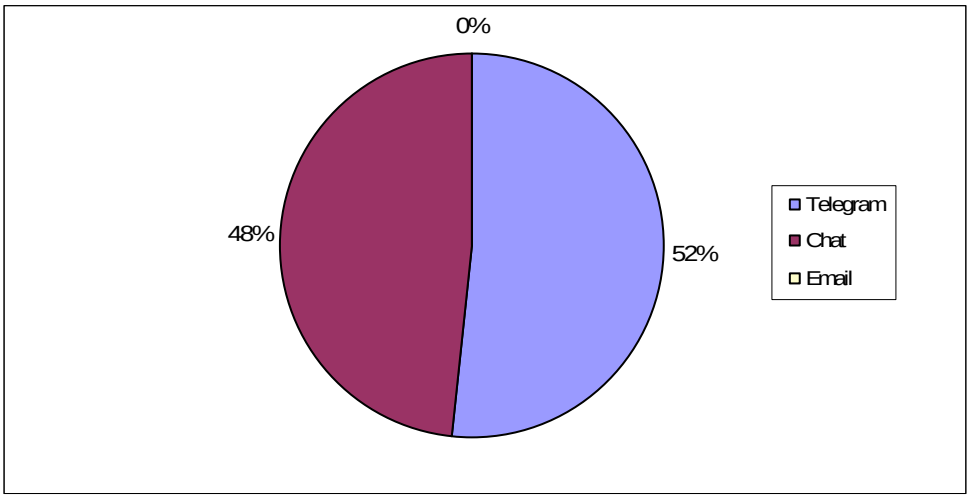

Figure C11. M6 Communication method comparison.

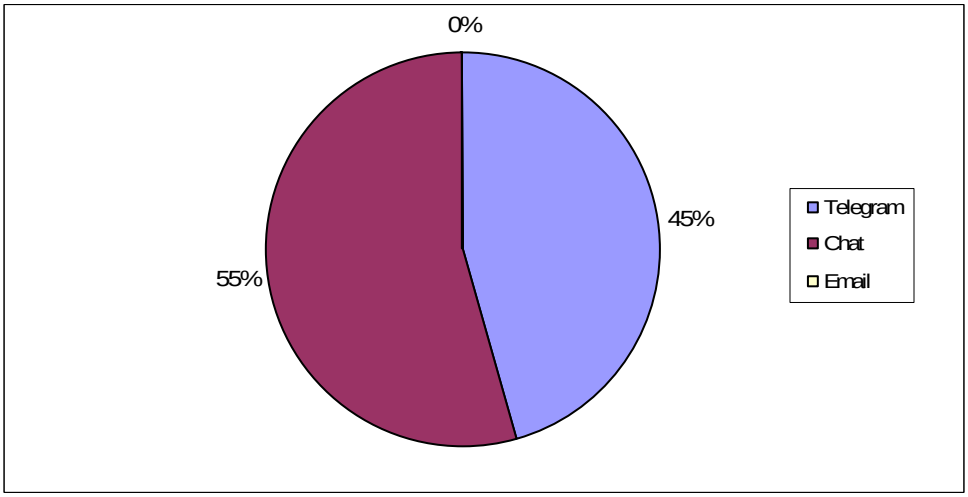

Figure C12. M6 Post length comparison.

Student 7

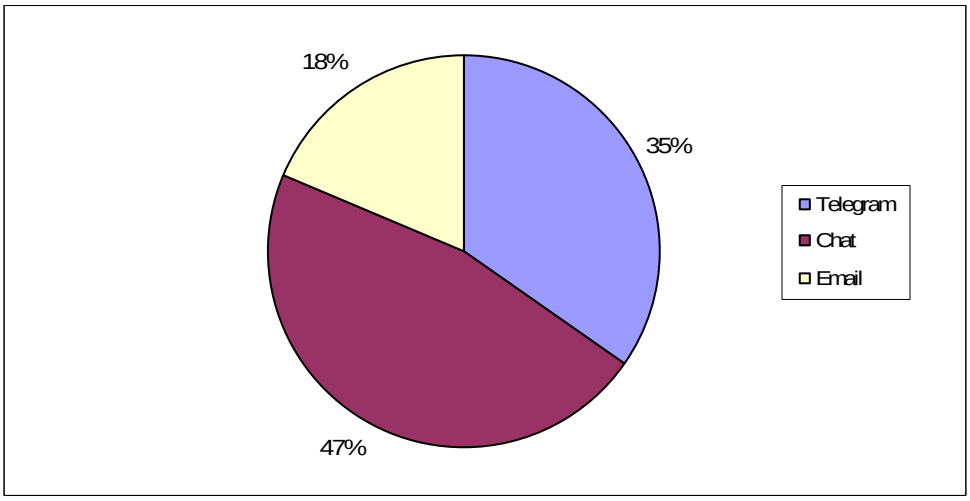

Figure C13. M7 Communication method comparison.

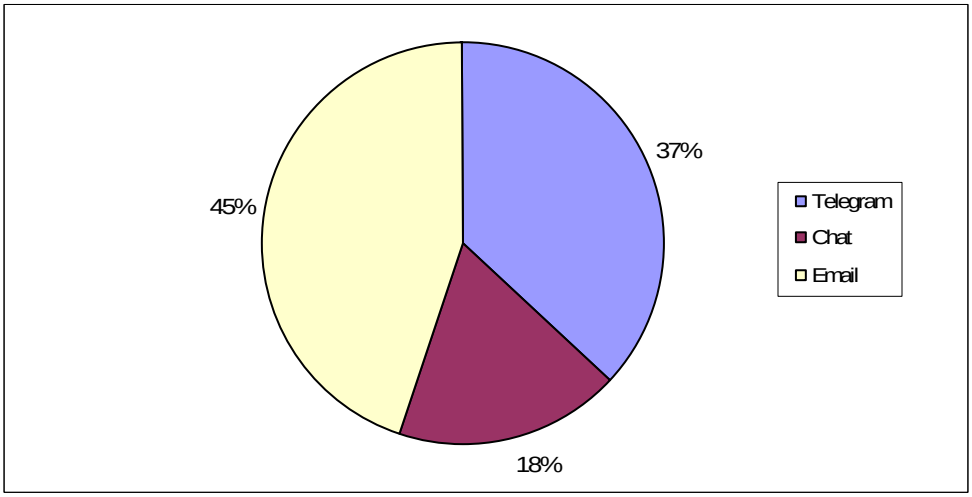

Figure C14. M7 Post length comparison.

Student 8

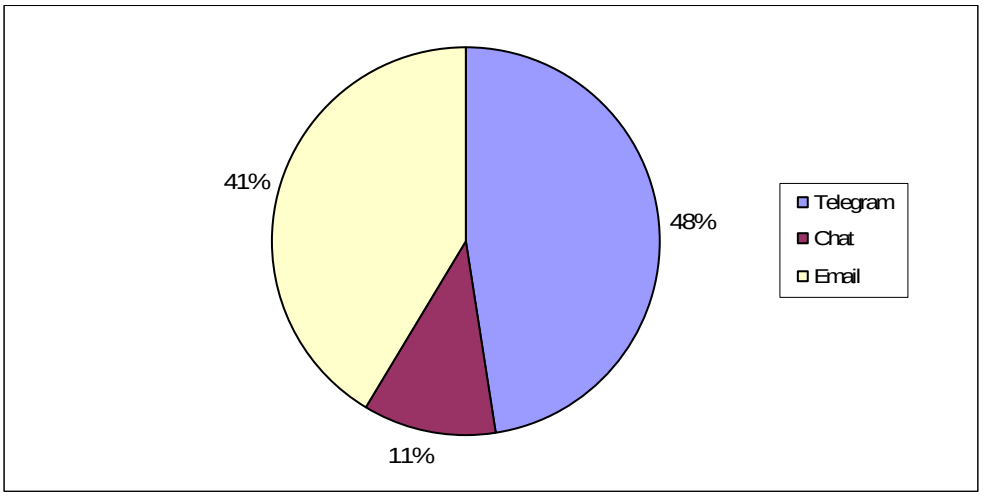

Figure C15. F8 Communication method comparison.

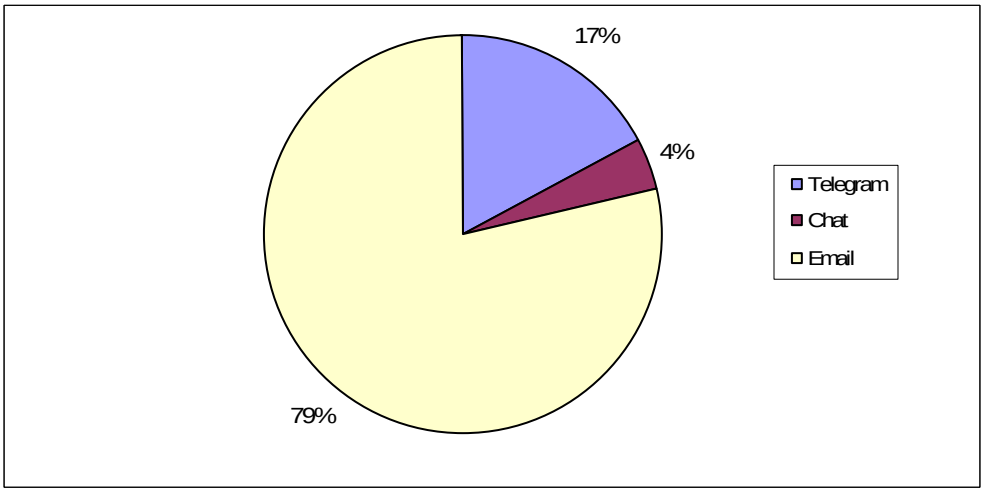

Figure C16. F8 Post length comparison.

Student 9

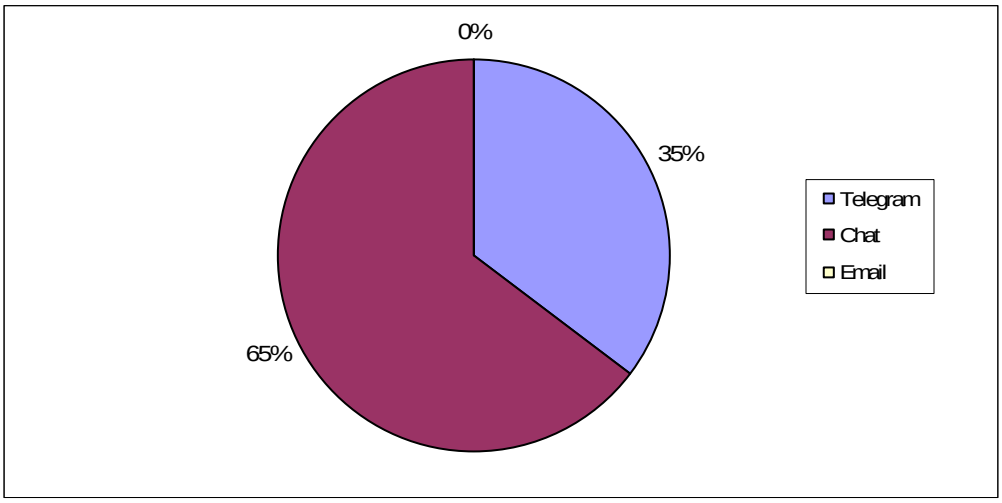

Figure C17. M9 Communication method comparison.

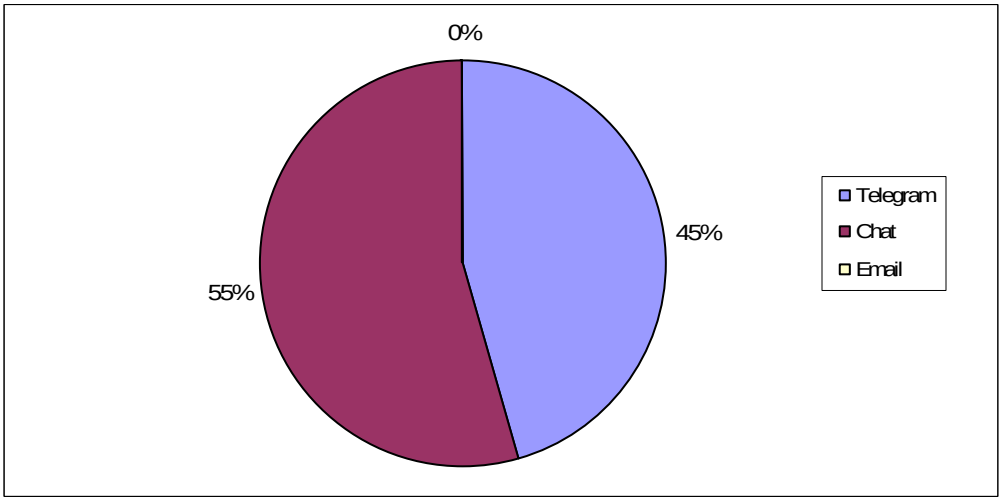

Figure C18. M9 Post length comparison.

Appendix D:

Post Length Comparison according to Communication Tool

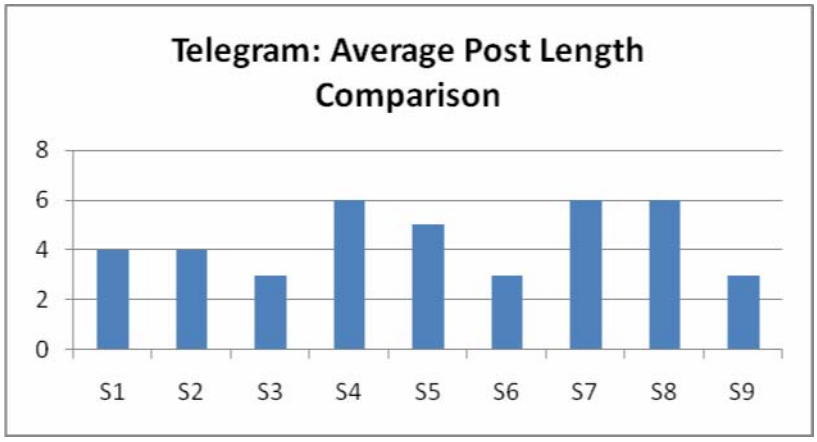

Figure D1. Telegram: Average post length comparison.

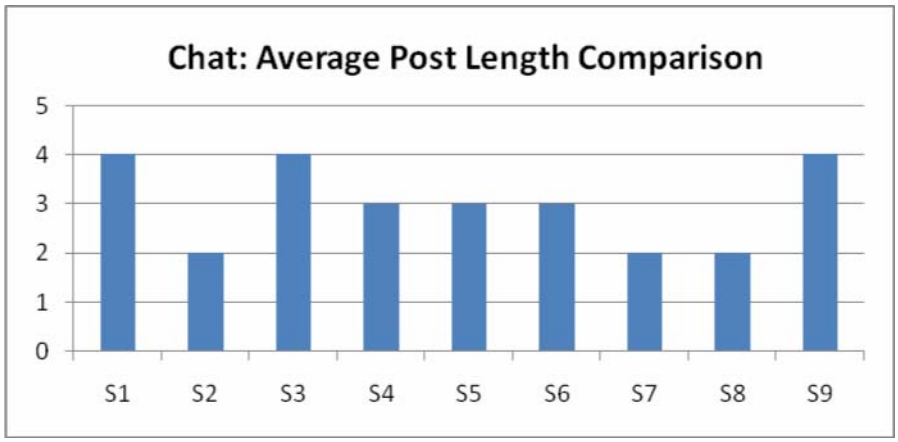

Figure D2. Chat: Average post length comparison.

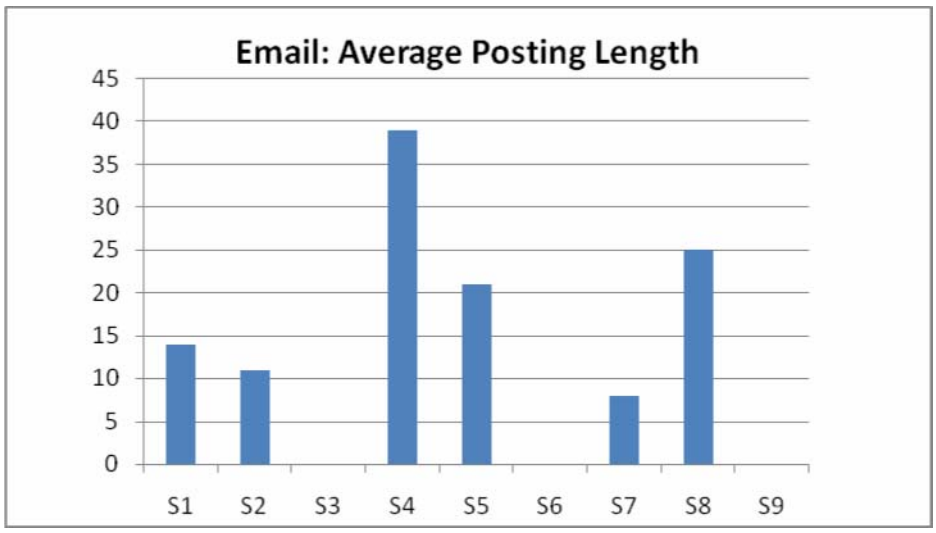

Figure D3. Email: Average post length comparison.

Appendix E:

Discussion of Results for Individual Students

Student 1

M1 used telegrams to communicate 53% of the time, chat 44% and email only 3%. The majority of his telegrams were sent to non-class members and the recipients of his chat posts were primarily non-specific. Conversely, the majority of his emails were sent to class members. He indicated in his interview that he enjoyed both telegram and chat as methods of communication for different reasons. He thought that while telegrams were more private, chat was more convenient to use. He also indicated that he did not enjoy emailing very much but did not know why. While he only used email 3% of the time, emails accounted for almost half of the volume of his posts.

Student 2

M2 used telegrams to communicate 44% of the time, chat 49% and email only 7%. All of his telegrams were sent to class members while his chat post recipients were primarily either non-class members or non-specific. All of his email recipients were class members. He indicated in his interview that he enjoyed chat because he could ask people for directions there. He liked telegrams because they are “quicker and easier to send”. He indicated that he did not enjoy using emails to communicate because his inbox would get cluttered and they were time consuming. While M2 posted by email only 7% of the time, the content of the email amounted to 39%.

Student 3

M3 used telegrams to communicate 23% of the time, chat 77% and did not use email at all. All of his telegram recipients were class members while most of his chat post recipients were non-specific. S3 did not send any emails. He indicated in his interview that he enjoyed using the chat tool because he thinks “it's very fun and cool to talk to people from across the world”. He thought telegrams were useful as “you can talk to people and use their real names instead of their game names.” He also indicated that while he enjoyed receiving emails and checked his inbox regularly, he preferred to communicate using telegrams. While M3 used telegrams to communicate 23% of the time he used more words in his telegrams than in his chat postings.

Student 4

F4 used telegrams to communicate 39% of the time, chat 51% and email 10%. The majority of her telegram recipients were non-class members and the recipients of her chat postings were primarily non-specified. Her emails were closely spread between class members and non-class members. She indicated in her interview that she used telegrams more than chat but that she liked chat because she could talk to everyone. She saw a drawback in chat as “If you don’t want everyone to know the conversation youre talking about then they can see it on the chat.” She liked telegrams because she could speak to one person at a time. She responded enthusiastically about emailing, stating that she enjoyed checking her mailbox, getting new mail and replying to messages. Although F4 used chat most frequently, her posts were very short, accounting for only 7% of the total volume. The greatest discrepancy occurs with the email tool where she posted 10% and her email posts accounted for 81% of the total post volume.

Student 5

F5 used telegrams to communicate 42% of the time, chat 33% and email 25%. Her telegram recipients were primarily class members while her chat postings were not specified most of the time. Most of her emails were sent to class members. She indicated in her interview that she thought the chat tool was a good idea but that she did not use it very much. She indicated that she likes talking to one person at a time and so does not like the chat as much as the other tools. Regarding telegrams she said “I like it because it is faster and I like talking to people.” She liked emailing more than telegrams because she was able to get to know people even better here and said ‘I LOVE emailing! It is the first thing I check when I go on QA”. She checked her inbox regularly and also said about emails “I like it cause you can communicate with your friends and you can talk about stuff on QA and I like typing.” F5’s insights about her communication tool preferences bore out in the data in terms of length comparison. Her emails contained 78% of the total volume, telegrams 16% and chat 6%.

Student 6

M6 used telegrams to communicate 52% of the time, chat 48% and did not use email at all. His telegram recipients were primarily both class members and non-class members. His chat post recipients were primarily not specified and he did not send any emails. He thought that chat was a good tool but felt that telegrams were more “fun than chat” as he was able to choose the name of the person he wanted to talk to. He indicated that he did not use email because he did not know how to use it. He also said that he did not check his inbox regularly. The difference between M6’s post frequency and his post length was minimal.

Student 7

M7 used telegrams to communicate 35% of the time, chat 47% and email 18%. His telegrams were closely spread between class members and non-class members. Most of his chat post recipients were non-specific and the majority of his emails were sent to class members. He was comfortable with the chat tool and enjoyed the fact that everyone could see his posts. He liked the privacy afforded by the telegram tool. He felt similarly about the email tool but mentioned that, unlike telegrams, he liked being able to see the content of his emails. The volume of M7's posts were as follows: telegram 37%, chat 18% and email 45%.

Student 8

F8 used telegrams to communicate 48% of the time, chat 11% and email 41%. Her telegram recipients were spread closely between class and non-class members. Most of her chat post recipients were non-specific while the majority of her emails were sent to class members. She indicated in her interview that she thought the chat tool was "cool" and liked that she could talk to people from other countries. She also mentioned that she liked using telegrams. She commented that she liked email and used it frequently because she could talk about "QA or things we are doing". The data shows this to be true. She said the first thing she did on QA was check her inbox. F8 post length breakdown: chat 4%, telegram 17% and email 79%.

Student 9

M9 used telegrams to communicate 35% of the time, chat 65% and did not use email at all. His telegram and chat post recipients were primarily class members and he

did not send any emails. He thought that chat was “okay” and used it some of the time. He also said that he liked the privacy afforded by telegrams. He said he has checked his emails at times but has not sent one and said he preferred telegrams to emails. He thought chat was a good tool but felt that telegrams were more “fun than chat” as he was able to choose the name of the person he wanted to talk to. He indicated that he did not use email because he did not know how to use it. He also said that he did not check his inbox regularly. The difference between M9’s post frequency and his post length is minimal.

UNIVERSITY OF SASKATCHEWAN

Behavioural Research Ethics Board (B[illegible]-REB)

Certificate of Approval

PRINCIPAL INVESTIGATOR	DEPARTMENT	BEH#
Dirk Morrison	Extension Division	08-91

INSTITUTION(S) WHERE RESEARCH WILL BE CONDUCTED
University of Saskatchewan
Saskatoon SK

STUDENT RESEARCHERS
Ann Cook

SPONSOR
UNFUNDED

TITLE
A Case Study of Manifestations and Significance of Social Presence in Multi-User Virtal Environment

ORIGINAL REVIEW DATE	APPROVAL ON	APPROVAL OF:	EXPIRY DATE
11-Apr-2008	15-May-2008	Ethics Application Consent Protocol	14-May-2009

Full Board Meeting ☐ Date of Full Board Meeting:

Delegated Review ☒

CERTIFICATION

The University of Saskatchewan Behavioural Research Ethics Board has reviewed the above-named research project. The proposal was found to be acceptable on ethical grounds. The principal investigator has the responsibility for any other administrative or regulatory approvals that may pertain to this research project, and for ensuring that the authorized research is carried out according to the conditions outlined in the original protocol submitted for ethics review. This Certificate of Approval is valid for the above time period provided there is no change in experimental protocol or consent process or documents.

Any significant changes to your proposed method, or your consent and recruitment procedures should be reported to the Chair for Research Ethics Board consideration in advance of its implementation.

ONGOING REVIEW REQUIREMENTS

In order to receive annual renewal, a status report must be submitted to the REB Chair for Board consideration within one month of the current expiry date each year the study remains open, and upon study completion. Please refer to the following website for further instructions: *http://www.usask.ca/research/ethics_review/*

John Rigby, Chair
University of Saskatchewan
Behavioural Research Ethics Board

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